THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. CX. No. 2459.] LONDON, JUNE 28, 1910. [62ND YEAR. PRICE 6d.

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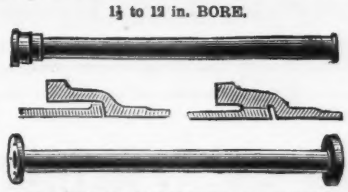

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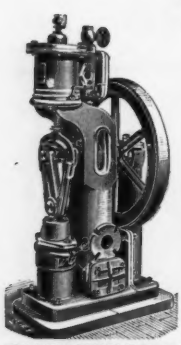

Fig. 705. "SINGLE RAM" STEAM-PUMP.

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

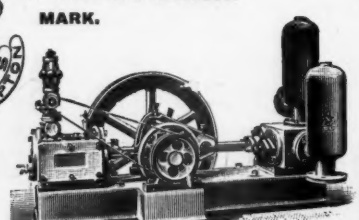

Fig. 685. "RELIABLE" STEAM PUMP FOR TAR AND THICK FLUIDS.

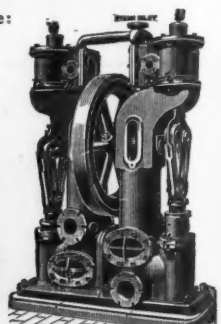

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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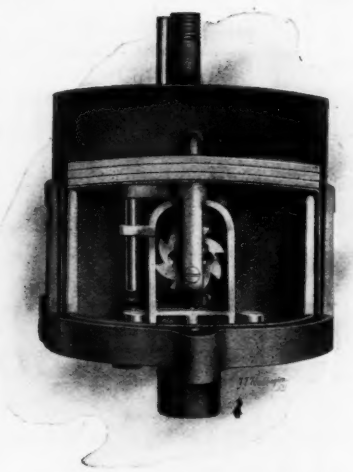

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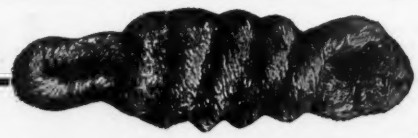

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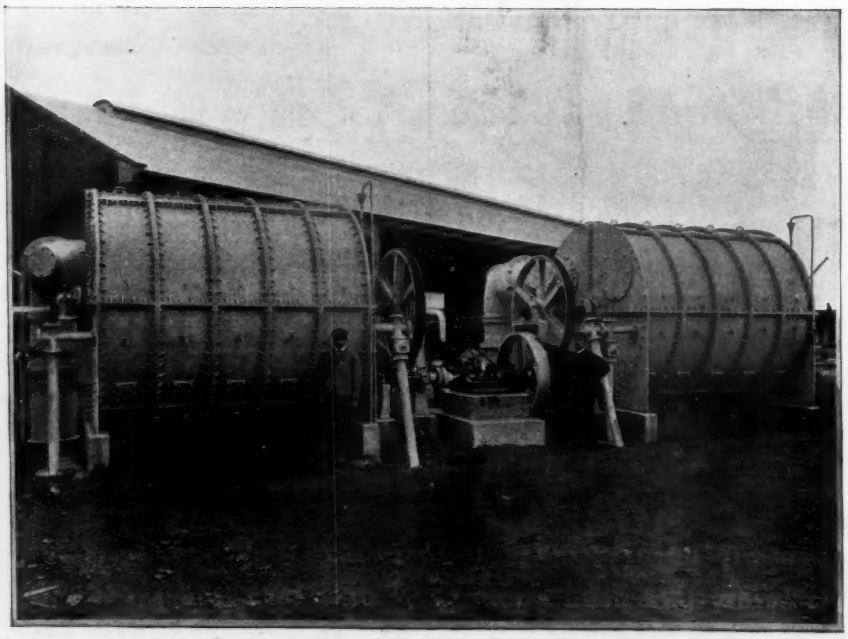

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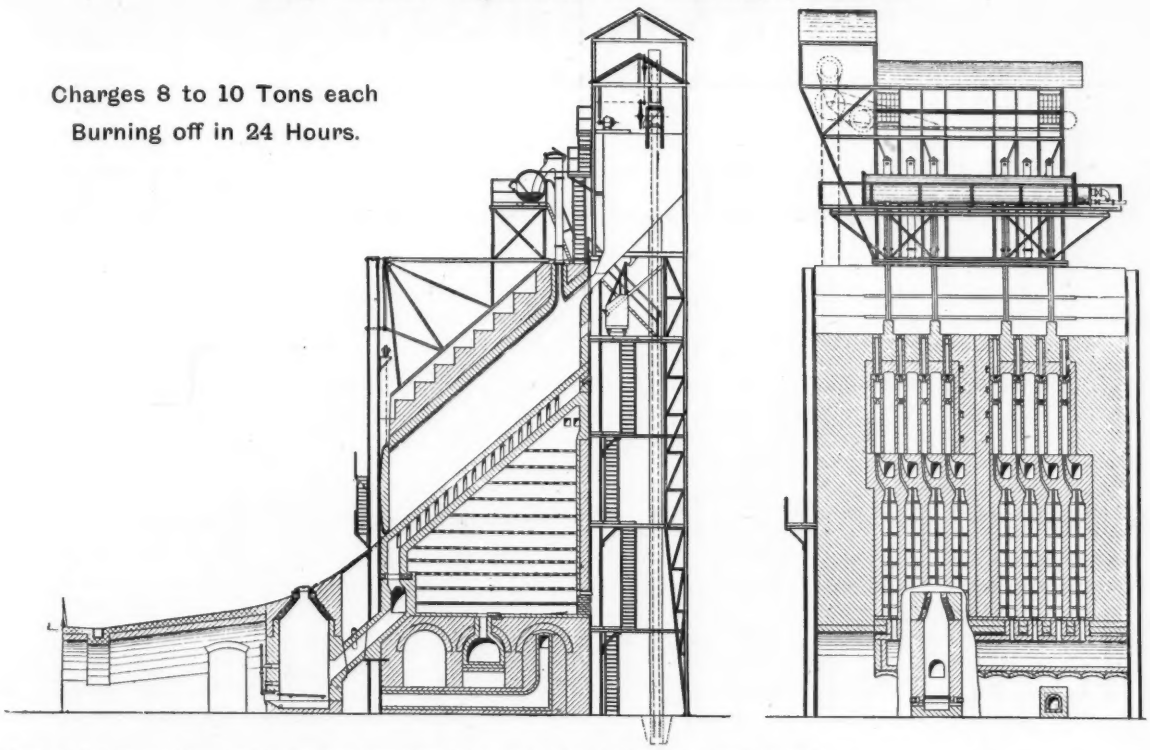

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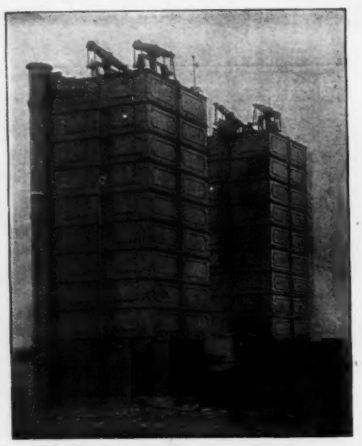

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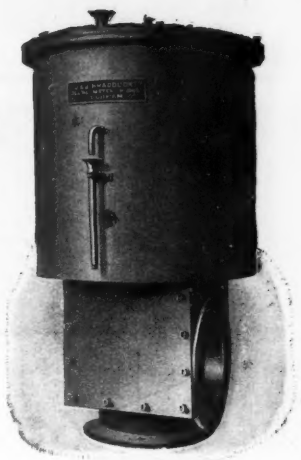

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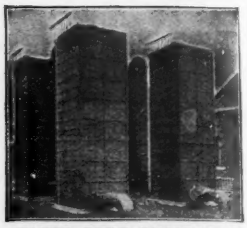

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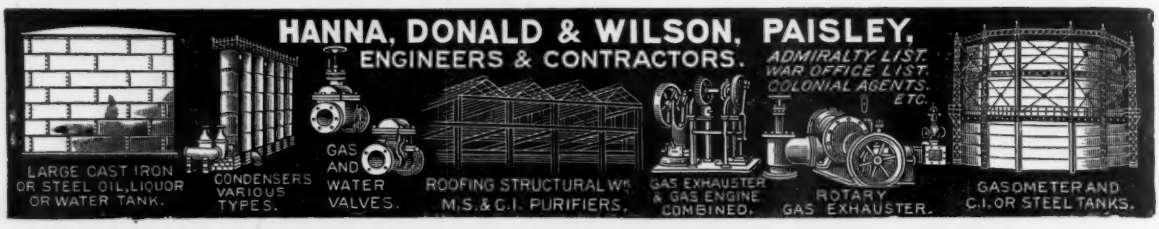

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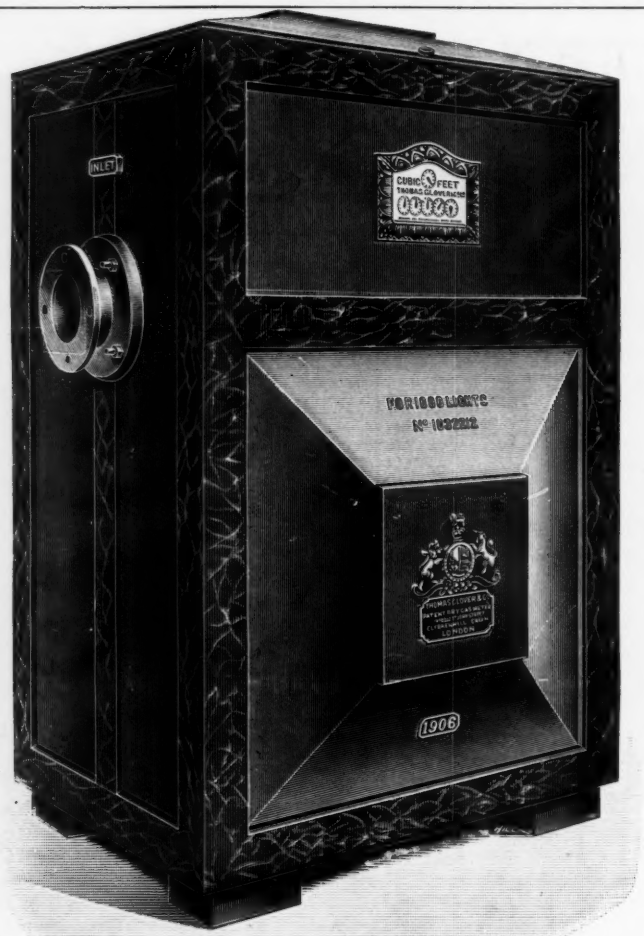

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JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. CX., No. 2459.—TUESDAY, JUNE 28, 1910.

EDITORIAL NOTES—GAS, &c.

Standard Burner Bills—Second Reading Carried.

THE local authorities who made such strenuous efforts to overthrow the Standard Burner Bills in the House of Commons on the second reading have done the gas industry an immense service, for which they are hereby most heartily thanked. They have succeeded not in convincing the House that Parliament has been befooled over the past five or six sessions, that the new standard burner is the evil thing in its effects that they have represented it to be, and that any injustice is being done to any single community or its interests (through inadequate opportunity for the presentation of their individual cases) by the joint promotion of these three Bills, but in showing that not one single contention submitted by them has the sympathy of a majority of the House, that the Government are absolutely in favour of industrial progress, and against the shackling of industry by the perpetuation of the application of old conditions to changed circumstances, and that the Government are in favour of the coordination through the country of the standard testing instruments applied to gas. And, moreover, the local authorities, through their action on second reading, have supplied a greater encouragement to gas undertakings than they have ever had before to persist in bringing about, as rapidly as possible, uniformity in the matter of the test-burner. The opponents have really to be thanked for the mistake they have made—a mistake in keeping with the errors and blunderings, and misconceptions and misrepresentations, that have marked the whole course of the hostility to these Bills from their inception; and we suppose will continue to do so to the end of the Committee stage, owing to the difficulty of driving home the truth through stubborn resistance to its reception and through the interested motives of competitors.

But, as we say, the promoters have, on second reading of the Bills, done good service to the industry; for the industry has now a better insight than it had before of the strength of the high-placed support that is behind it in this matter of the adoption of the "Metropolitan" No. 2 burner. With all the beating up that members of Parliament have had, with all the priming constituted of hypothesis and sentiment that members have received from the principal movers in this attempt to obstruct the gas industry's progress, there was a comparatively thin House when the Bills were, according to notice and order, introduced for second reading. The largest number taking part in the divisions on Nos. 1 and 2 Bills (the opposition on second reading to No. 3 Bill has since been withdrawn) was 152, excluding the tellers; so that this does not show any striking interest in the House as the result of the activity and agitation of the opposing forces. And in this small House, No. 1 Bill was sent forward by a vote on division of 80 to 61; No. 2 Bill by a vote of 96 to 56. This, again, is a proof that the declamatory misrepresentation that took place in the House was properly assessed at its true value, and had little weight. An analysis of the list of those who pronounced in favour of second reading shows that the voting was distinctly on non-party lines; but the amount of support the Bills received from the Government must have been just as much a shock to the opposition as it is a pleasure to the promoters. What have the local authorities to say to the Right Hon. John Burns, the President of the Local Government Board, declaring in favour of the Bills? In addition, the Government, and the various Government Departments, were represented by the Right Hon. Lloyd George, the Right Hon. A. Birrell, the Right Hon. Thomas Burt, the Right Hon. Alfred Emmott (the Chairman of Committees), the Right Hon. Walter Runciman, the Right Hon. H. L. Samuel, the Right Hon. Alex. Ure, and Mr. Percy H. Illingworth, of the Board of Trade.

Such unanimous support on the part of the Government may be variously regarded. It may be contended by the opponents of the measures that it merely indicates the preference of the Government for Bills of this special nature being adjudicated upon by a Committee who can consider the matter in dispute in all its bearings. If that were the only reason for their support, we should be abundantly satisfied. But there are other reasons. Throughout the debate, the supposititious detriment to public interests of joint promotions of this kind was one of the strings vigorously played upon by members who were the mouthpieces of the opposition; but the attitude of the Government is sufficient assurance that they do not share in those views, which have only been framed and presented in the effort to secure a defeat on a side-issue. The effort has failed. There is another obvious reason; and it is that the Government have determined to support the Board of Trade in this matter of the standard burner; and the Board of Trade on their part intend to abide by the judgment of their scientific advisers. Mr. Percy Illingworth, representing the Board of Trade, in his speech on No. 1 Bill, said that the Board in this matter took up an attitude of benevolent neutrality; but he counselled that the Bills should be sent forward to Committee. In Mr. Illingworth's speech on No. 2 Bill, however, we get set forth the view of the Board of Trade. The honourable member remarked: "The Board "of Trade view is that it is desirable, in place of the various "test-burners now in use, to adopt the burner which has "been recommended by their own scientific advisers, in "order to secure an absolute standard of uniformity in re-"gard to gas in all parts of the country, and to make com-"parisons possible in the interests of economy and useful-"ness of the article produced." The gas industry wants nothing more than this declaration to encourage them to persevere in bringing about what the Board of Trade consider desirable; and, the Board of Trade so considering, there is presented a very good reason why the Bills should have obtained, as they did obtain, the united support of the members of the Government in the House at the time of the divisions. Before leaving the question of the support that the Bills received, the signal services rendered by Sir Daniel F. Goddard, Sir Fortescue Flannery, Mr. Ryland Adkins, and Mr. J. F. L. Brunner, in placing the true facts before the House, ought to be mentioned. Among the names, too, of members who voted for the Bills are noticed those of Mr. W. H. Cowan and Mr. J. H. Duncan, one of the Directors of the Otley Gas Company.

In palliation of their defeat, the opponents may urge that the withdrawal from opposition of the Liverpool Corporation to the second reading had the effect of lessening the extent of their support. Examination of the voting-lists, and of the speeches made on behalf of the hostile authorities, does not lend colour to the submission. Liverpool at the eleventh hour adopted the very sensible attitude (and the promoters took steps before the motions for second reading came on to place all other opponents in practically the same position as Liverpool) of agreeing to withdraw from opposition on second reading if an Instruction were given to the Committee on the Bills to consider, on the request of any of the petitioners, the expediency of further dividing the measures, in order to remove any difficulties that might, in their opinion, be proved to exist (by reason of the inclusion of several companies in the Bill) in the submission separately of any of the cases in opposition—the idea being, if thought desirable by the Committee, to detach from the Bills any companies with special circumstances attaching that require independent consideration, and place them in a Bill apart. It is almost certain that Liverpool will be so dealt with. But this provision notwithstanding, the hostility to second reading was persisted in, which shows clearly that the local authorities would have preferred to overthrow the Bills in this fashion rather than go again before a Committee with the loosely woven and unsubstantial case they were able to present to the Lords Committee.

We will not occupy time or space dealing here with the

extravagant statements, misconceptions, and misrepresentations to which the House was treated during the debate by those who spoke for the opposing local authorities. Practical considerations and not theoretical and hypothetical ones, common sense and not silly appeals to sentimentality concerning the poor (who have the means of one domestic economy in the incandescent burner), succeeded, and allowed the measures to emerge triumphantly from the second reading. Parliament and the Government have declared in favour of the gas industry's progress, and in favour of economical legislation as exemplified by this joint promotion for a common and wise purpose.

The Meeting of the Société Technique.

The two weeks which have just closed will stand out prominently in the year's record of the progress of the gas industry. Scarcely had the members of the Institution of Gas Engineers brought their meeting to a close, than their colleagues in France and Germany opened theirs. The proceedings of the German Association are dealt with elsewhere. Here we have only to notice those of the French Society. The meeting was held in Paris, under the presidency of M. Godinet, of Lyons; and it opened on Monday last week—a day earlier than usual, to allow of the week end being spent in Brussels, on the invitation of the Belgian Association of Gas Managers, whose President is M. Prisse, to visit the exhibition and inspect some of the gas-works of the city. The invitation was accepted by about eighty members. A similar one was addressed to the Institution of Gas Engineers; and the President (Mr. Alexander Wilson), the Past-President (Mr. James W. Helps), and Hon. Secretary (Mr. S. Y. Shoubridge), accompanied by Mr. P. Holmes Hunt, the President of the Victorian Association of Gas Managers, joined their Belgian and French colleagues. It will be seen, from the account of the proceedings—necessarily much condensed—which appears elsewhere to-day, that the welcome accorded to the members of both organizations was of the very heartiest character.

Turning to the business at the meeting of the Société Technique, the morning of the first day was, as is usual, devoted to routine matters. There was a good addition to the lists of both members and associates, the total of which, with the 22 honorary members, is now 798. The roll has grown to such an extent of late years, that a change in the constitution of the Society became necessary; and a feature of the first morning's proceedings was a proposal by the Committee to increase their number to 21, and to have three Vice-Presidents. The feeling of the members on this matter was shown by their unanimous adoption of the proposal. The new Committee was then elected; and at a subsequent stage of the proceedings it was announced that M. Godinet's successor in the presidency would be M. Marquisan, whose name may be remembered by some readers in connection with his paper on "Vertical Retorts," read first before the Society of Civil Engineers of France, and subsequently submitted to the Société Technique. The paper was noticed in the "Journal" at the time. A great part of the afternoon was occupied with the distribution of the medals and awards by the Government and the Society; but time was left for some technical business, and what was the chief communication dealing with carbonization was submitted by M. Parsy. It was a discourse on the Klönne chamber ovens, and was specially interesting from the fact that the author showed that these settings are applicable to small works.

It is unnecessary to refer in detail to the papers, of which there were about twenty, some, of course, quite short—as the subjects dealt with are indicated elsewhere. Especial mention may, however, be made of one by M. Bonnet, on a new form of gasholder tank, for which patents have been taken out by the Machinenfabrik Augsburg-Nürnberg. It evoked some criticism from M. Leclaire, who gave what was very much like another contribution on the subject. M. Grebel read two papers—one on a new system of condensation, and the other on a reflector for economizing light. An interesting communication was submitted by M. Greyson de Schodt, on his system of lighting by means of incandescent burners set at an angle. M. Vanderpol discoursed on the advantages of the pre-mixing of gas and air for obtaining perfect combustion of coal gas. M. Bromham, of Brussels, directed attention to a sulphate turbine. The other papers are mentioned in the review of the proceedings appearing elsewhere. An innovation during the past few years has been the setting down of subjects for discussion. One of these was on the means to be employed in order to prevent the fouling of gas in holders; and it will probably come up again next year.

During the week visits were paid to no less than five gas-works—two in Paris and three in Brussels—at all of which the members were very cordially received. The new works at Gennevilliers presented many points of interest, especially the installation of Munich inclined chamber settings; and at the works of the Society du Gaz de Paris at Le Landy the members saw a combination of the old and the new in gas-works construction. At the Forest works of the Imperial Continental Gas Association (under the supervision of Mr. Henry Salomons) the old is gradually being converted into the new, and extensions are about to be undertaken. The Jette-St.-Pierre works of the St. Josse-ten-Noode Gas Company—constructed in a remarkably short space of time—and the Brussels Municipal Works at Schaerbeek both possessed features which made their inspection instructive to the visitors.

This notice of the meeting must not close without reference to the generous hospitality displayed by the Belgian Association of Gas Managers to those whom they had invited to Brussels. These included members of the Council of our own Institution, the new President of which—Mr. Alex. Wilson—referred in felicitous language to the beneficial effect of such international gatherings, as strengthening the bonds of union in the gas fraternity. Further opportunity for doing this will be afforded on the occasion of the meeting of the Dutch Association of Gas Managers in Brussels early next month. Altogether, if the congress of the Société Technique for 1910 did not produce any technical literature of a striking character, it will be recalled with very pleasant recollections by many who attended it.

Meeting of the German Gas Association.

It is a curious fact that, throughout the first fifty years of its existence, the German Association of Gas and Water Engineers had not held its annual meeting in either of the two important towns bordering on the Baltic coast—viz., Dantzig and Königsberg—though practically every other town of equal size in the Empire, and some outside it, had been visited at least once during the half century. For its fifty-first meeting, however, which was held last week, the far-east town of Königsberg was chosen, mainly no doubt on account of the interest which attaches to a gas-works which has developed so rapidly as that owned by the Corporation of the city under the able management of a Gas Engineer of such striking individuality and originality as Herr Kobbert. It will be seen from the report of the proceedings at the meeting (by our Special Representative) in another column of to-day's "Journal," that the comparatively isolated position of Königsberg was responsible for a relatively small attendance of members. Notwithstanding this, the technical proceedings were of considerable interest though the brilliancy of the social functions necessarily paled before that of those of the celebration of the jubilee of the Association at Frankfort last year.

In many respects the most interesting portion of the technical programme of the meetings is now the report of the work carried out at the Instructional and Experimental Works of the Association at Carlsruhe. The matter of most interest in the report presented last week on that work—to English gas engineers at least—will be the announcement that a systematic investigation of the gas-making qualities of the more important varieties of English gas coals is to be undertaken with the exhaustiveness which has characterized the investigations already made at the experimental works on the principal descriptions of German gas coals. A provisional statement of the results of the laboratory analyses, which are made as a preliminary to the gas-making trials, is given on another page of to-day's "Journal," and refers to a considerable number of well-known typical English gas coals. The final report will be awaited with interest by all English gas engineers, especially if the investigation is extended to some of the coals which, though not generally regarded as gas coals, the recent modifications in the requirements as to the quality of gas have rendered available for gas manufacture.

The papers presented at the meeting included two of minor importance on processes for the purification of gas, and an interesting communication by Herr Max Mayer, on some investigations on the variation in the efficiency of incandescent burners with changes in the calorific power of

the gas consumed. He concludes that M. St. Claire Deville's much-debated proposition, that the illuminating power of a mantle is proportional to the calorific power of the gas used, is true only within somewhat restricted limits of variation of the calorific power. These limits, it is true, include most of the gas at present supplied from works in this country; but it is not improbable that gas of a lower calorific power than 480 B.Th.U. net per cubic foot (which is Dr. Mayer's lower limit) will shortly be very commonly supplied. Readers of the "JOURNAL" may be reminded in this connection that even now the Gaslight and Coke Company are entitled to supply gas of only 450 B.Th.U. net without incurring a forfeiture. Dr. Mayer shows fairly conclusively that the illuminating duty, under the mantle, of such comparatively poor gases is, relatively to their calorific power, greater than that of rich gases, which is a point of extreme importance in regard to the quality of gas supplies in the future. Abstract translations of Dr. Mayer's interesting paper, and of the two papers on purification, are given in to-day's "JOURNAL."

Others papers read are more briefly referred to in the report of our Special Correspondent on the Proceedings, and abstract translations will be published in due course. Two papers dealt mainly with the question of the proper allowance for depreciation and interest charges in respect of plant on, in particular, municipal gas-works. They were written rather from the German standpoint; but nevertheless will be worth the attention of gas engineers, and of others concerned with problems of municipal trading. A valuable paper by Dr. E. Schilling, of Munich, contained a pretty exhaustive summary of the applications of gas at the present time to industrial purposes, and of the descriptions of apparatus employed therefor. A paper by Dr. K. Bunte gives a number of conclusions at which he has arrived (from his experience as Superintendent of the Association's Experimental Works) as to the assessment of the quality of gas coals from the results of analyses and gas-making trials. The paper, of which a translation is given elsewhere to-day, is of a suggestive and valuable character.

Readers of the "JOURNAL" will hear with regret that the father of the last-named author—Geheimrat Professor H. Bunte—was too ill to attend last week's meeting; and they will join in the wishes for his speedy recovery which were expressed by those present. A number of other leading gas men of the Continent who are almost invariably found at these gatherings were unfortunately unable to attend the Königsberg meeting last week. Though the technical proceedings lost considerably in interest on this account, they were, on the whole, on as high a plane as is customary; and the business of the sittings was carried through with a promptitude and order which were highly creditable to Herr Heinrich Prenger, the Manager of the Cologne Gas, Water, and Electricity Works, who, as President of the Association, occupied the chair throughout the sittings.

Examinations—An Unfortunate Resolve.

THERE exists a good deal of heart-burning among the successful candidates at the recent examinations, over the resolve of the authorities of the City and Guilds of London Institute not to in future supply the pass-lists to the press. The warning that this would be the case, has been given to the press before this year; but this is the first occasion that the lists have been positively refused. As mentioned last week (p. 776), the explanation given for this change is extreme pressure of work in the office and other reasons. What those "other reasons" are, we have not the faintest notion; but as it may be assumed that the strongest of all reasons has been vouchsafed in the "pressure of work" in the office, the "other reasons" cannot be of much account. The main one is subject to easy and inexpensive rectification; and, as a matter of fact, we have offered, on a past occasion, to save, so far as we are concerned, the additional work involved in the preparation of the pass-lists if the authorities would permit us to send and make out a copy of the passes for our own use and publication. But there has not been a satisfactory reply to this suggestion.

We do not want to in any way set ourselves in antagonism with the City and Guilds of London Institute. But we do not think they have regarded this matter sufficiently from the standpoint of the candidates themselves; and we would plead with them to reconsider their decision from that point of view. The knowledge that there will be independent publication of their successes without themselves having to announce the fact, is a great encouragement to students; and it must be in cases one of the inducing factors to presentation for examination. In an industry such as that of gas, the publication of successes is a distinct advantage to the young men who are qualifying for higher positions; and the publication has often proved a guide, in the matter of junior appointments, to senior members of the gas profession. On all hands, publication is an advantage; and we do sincerely regret the decision of the authorities of the City and Guilds of London Institute. We fear if they persist in withholding the pass-lists, that it will damage somewhat the popularity of the examinations. This, strong supporters as we are of all educational work that is of advantage to the industry, we should greatly regret. Meanwhile, the only means of obtaining a complete list of passes is for those who have been successful in the examinations to send us their names, mentioning the divisions—"Gas Engineering" or "Gas Supply," and Honours or Ordinary—and the class of certificate obtained; and we will from the responses compile a list. If the City and Guilds of London Institute continue to adhere to their present—and we think most unfortunate—decision, this suggestion may be taken to apply not only to this year but to the future. It is the only way out of the difficulty.

Prediction, Result, and Cause.

IN discussing the question of the necessity for an extended base for the Institution of Gas Engineers, as has been suggested by the ex-President of the Institution (Mr. James W. Helps), as well as in these columns, facts have to be looked fairly and squarely in the face. The first question that it is necessary to ask one's self is, Why is it the Institution is not accorded by the gas undertakings of the British Isles a greater measure of support? By those who give it consideration, two answers may variously be offered to the inquiry, though both may not be correct. The one is that the Institution has not shown itself worthy of the support of gas undertakings; and the other that the administrations of British gas undertakings have not been sufficiently educated to see the need of financing co-operative work to the general behoof of the industry. We incline distinctly to the latter view, though there may be others—and many of them—who may construe Mr. Corbet Woodall's remarks, in proposing a vote of thanks to the President for his address at the recent meeting, to mean that the Institution have not proved themselves worthy of the support of the gas undertakings of the country. Mr. Woodall, we think, would be the first to regret the placing on his words of any such interpretation. To recall what he said on this head, let us quote his remarks: "He "felt sure if the Institution was able to show by the work it "did that it was worthy of carrying on the widely extended "usefulness to which the President had referred, there "would be no considerable difficulty about finding funds. "If it could be shown that the Institution was equal to the "duty which had been suggested, he thought Directors and "others would appreciate it; and the money would be forth-"coming. He should be sorry to think that the gas industry "of England fell behind their friends in France and Germany, "where the amount of money placed at the disposal of insti-"tutions similar to their own was vastly greater than it was "with us."

These words cause the mind to revert to the annual dinner of the Southern Association on March 21, 1907, when the Council of the Institution were striving to get the administrations of gas undertakings to subscribe to the Special Purposes Fund, in order to enable the Institution to grapple, by concerted action, with the numerous technical problems that were awaiting, and still await, investigation and solution. At that dinner it was said: "If the work undertaken "was likely to be productive of good, there would be no "lack of funds to carry it on." He (the speaker) "was "sure there was patriotism among, and *camaraderie* enough "between, the gas companies and the gas corporations of this "country to cause them to join heartily in any such work "for the benefit of the whole industry." The speaker was Mr. Corbet Woodall. Three years and three months have elapsed since those words were spoken; and the period has not proved Mr. Woodall's prognostications of 1907 to have been well founded. There is no question now as to the likelihood of the work undertaken being productive of good; it has (within its limits) been so productive. But nevertheless the administrations of the gas undertakings of the country have shown a poor desire to give the Institution the opportunity of engaging in the extended work for the general good of the gas industry that was in contemplation

in 1906-7, and so they have virtually declined to allow the central professional organization to fully display its worthiness for being entrusted with the funds for still further enlarged work for the industry. It is truly a curious idea to put chains to the heels of the Institution, and then to say: "Now by the measure of activity you show, we shall be able "to judge your fitness and worthiness to undertake extended "work for the industry in future." What was the result of the special appeal, of all the writing, and of all the talking that took place in 1906 and the early part of 1907 respecting the creation of a Special Purposes Fund? The magnificent sum of £566 17s. 9d.! And in the three succeeding years the contributions have been: 1907, £446; 1908, £390; and 1909, £404. As one looks at these sums, a certain amount of bitterness cannot be repressed over the apathy and the spirit of indifference that are so extensively found in the only quarters from which the necessary funds can emanate; and yet all gas undertakings enjoy the benefits that accrue from the work—restricted though it be—in which limited funds enable the Institution to engage. From the work accomplished in connection with gas heating, and from the refractory materials inquiry, every gas undertaking in the country will reap advantage, though the expense of the researches has been borne by the few. The total of the four sums named—most of which money represents four annual subscriptions by the same undertakings—is only £1806; whereas if the 790 statutory gas undertakings of the British Isles had contributed merely £5 a year each, the sum in the four years would have reached £15,800, or an average per year of close upon £4000. Or if the 790 statutory gas undertakings had contributed only 1s. per million cubic feet of gas sold, the income would have amounted to £8700 a year, or in the four years to £34,800.

Why has encouragement been so largely withheld? It is not because the Council have not shown the desire to engage in, nor a want of capacity for organizing and supervizing, useful solid work for the industry. If this is not the cause, then there is another. Mr. Woodall must not measure all gas directorates and committees by the men with whom he is frequently brought into contact, and who so largely rely upon his mature judgment in gas affairs, and agree to his advice to contribute to those things that appeal to him as being for the common good of the industry. His generous nature prompts a generous belief in his contemporaries in gas administration. We ask him to consider the figures we have quoted; and likewise the time that has elapsed since the Southern dinner speech. And we feel certain that, when he has done so, he will be prepared to put his hand forward to assist in the removal of the real cause that stands in the way of greater financial contribution to co-operative work. That there is a cause, no one can deny. The remedy is to be found in the proper education as to needs, and in the creation of a sense of community of interest, in the administrative quarters of the industry. The point will be enforced by appropriating the heading to an article that appeared in one of our daily contemporaries only recently: "Educate! "Educate!! Educate!!!"

Difference in the General Gas and Electricity Acts.

Acts of Parliament are made for guidance; but their numerous obscurities, and the consequent misconstructions, supply a large proportion of the litigation that occupies the Law Courts. But there seems little reason for the Leicester Corporation—and this applies to other local authorities who are not innocent of also acting *ultra vires*—misinterpreting their powers and rights respecting electric wiring and fittings supply and fixing. They have been following this business for nearly twenty years; and they have only just been pulled up by a case submitted to Mr. Justice Neville, in which the Attorney-General, at the relation of a Mr. Utley (who is a ratepayer of Leicester), moved for a declaration that the Corporation are not entitled to carry on the business of electrical contractors, and for an injunction restraining them from pursuing the business. As readers are aware, there has been a bitter struggle between municipal authorities who engage in fittings business and electrical contractors, who are averse to the former doing this sort of thing unless the work is executed through a contractor. We suspect that the modern recognition of the local contractor in granting wiring and fittings powers to municipalities is really the secret of the Leicester Corporation (instead of going to Parliament to put themselves right) preferring first to defend their long-standing course of procedure in the Law Courts, in the hope that ingenuity of argument might perchance secure to them the continuity of the liberty that they have so far enjoyed, and keep them free from the trammels of the private electricity trader. But unless the Corporation now appeal and succeed, their defence in the Courts has not served them in the first instance well; for in regard to both declaration and injunction, Mr. Justice Neville is against them.

His Lordship's view appears to be the rational one; that placed before him as the view of the Corporation, while ingenious, an irrational one. The Corporation have no express powers to carry on an electric wiring and fittings business; and their whole assumption as to rights in the matter seems to break down, and does in Mr. Justice Neville's opinion, when it is considered that other authorities, before entering upon the business, have obtained specific powers in their Special Acts or Provisional Orders, and that the matter was specially dealt with in the General Electricity Supply Act passed last year. On the face of it, if the Leicester Corporation under their existing powers possess the right of trading in this way as an ancillary business to that of the supply of electrical energy, it is obvious that other municipal authorities would have held the same right, and there would not have existed any necessity for dealing with the matter by any special legislation whatsoever. Moreover, there are not to be found in the General Electricity Acts any provisions similar, in respect of this matter, to those in the Gas-Works Clauses Act of 1871, or to the special clause in the Model Gas Bill; and that the absence is a deliberate one appears to be evinced by the inclusion of section 18 in the Act of 1882 which disentitles the electricity suppliers from prescribing any special form of lamp or burner, or in any way controlling or interfering with the manner in which electricity supplied by them under the Act, and any Licence, Order, or Special Act, is used. There was an attempt to set up an analogy between the Acts relating to gas and electricity, as indicating the intention of the Legislature to bestow upon the undertakers under the Electricity Acts powers with regard to the supply of electrical fittings and apparatus similar to those allowed by the Gas Acts. But this entirely failed.

It was ingeniously argued by Counsel, on behalf of the Corporation, that, if there is no express power in their Acts, they are authorized to carry on the fittings sale and work as being incidental to the undertaking of electricity supply—that, in other words, supply continues right up to the point of consumption; for until it reaches there the supply is not complete. If this be so, then everything that is used for getting to the place of consumption is part of, and necessary to, the supply. But the folly of the contention is disclosed by the position in which it would place a householder. It is within his right, under certain terms, to demand a supply of electricity; and if the contention had been upheld, where would his demand for the provision have terminated—at the meter or lamps? Mr. Justice Neville, however, inclined to the view that there is a distinction between supply and use; and that the acts complained of are referable to use not to supply. The only thing for the Leicester Corporation to do, unless they successfully appeal, is to obtain special power; but their lateness in applying for this will bring them under the modern form of provision, which will compel them to carry on the wiring and fittings business in such a manner that there is no loss (as there has been in the past) upon it; and, further, there is that—to electricity suppliers—objectionable feature as to the work being done through contractors. This is a case in which there is no alternative; so that what has to be done is quite clear. And the bitterness of it must be swallowed.

Coalite at Plymouth.

Sir Joseph Bellamy's references, at the annual meeting of the Plymouth and Stonehouse Gas Company last week, to the operations of the British Coalite Company will not do much towards reassuring those who invested money in coalite. His remarks were not unfriendly, nor even critical. The attitude of the Plymouth Gas Company to their partners has been one of steady loyalty. The coalite people have had a practically free hand. If there have been difficulties, they have not been of the Gas Company's creating. Subject to the obligation to supply a certain quantity of gas, the Coalite Company have been allowed to experiment as much as they pleased. Apparently they have availed themselves of the opportunity to the full. Since its installation two or three years since, the plant has undergone an

almost complete transformation. A year ago one of the three batteries, then newly erected, was being taken down, with a view to its being rebuilt on improved lines. At that time difficulty had been experienced in discharging the vertical stills, or in removing the coalite, owing to the fact that the batteries were so constructed that the discharging chamber was situated centrally underneath the setting, and therefore not easily accessible. This trouble has been overcome by rebuilding the batteries with the openings for the discharge of the coalite on the outside of the setting. To effect this improvement, it has been necessary to rearrange the conveyors; and this part of the plant has been remodelled, and the distance traversed considerably shortened. Another change which has been made is in the erection of a conveyor for the supply of fuel to the generators. These alterations have considerably modified the appearance of the plant. Possibly they have tended in the direction of a reduction in the number of men employed, which, on the occasion of a visit of inspection by a party of gas engineers, was commented upon as excessive. What other experiments have been made is not clear, and perhaps is not important, for apparently the plant is to undergo another modification, if not complete supersession. Sir Joseph Bellamy spoke of a "new plant" shortly to be put in, "by which it is hoped to economize 50 per cent. on the charges hitherto made." This is a truly wonderful prospect; and with its realization the patient shareholders will hope the old hope—that the period of experiment has at length ended.

The Gas Company's Bargain.

So far, happily, the Gas Company have had no reason to complain of their bargain. Sir Joseph told the shareholders that they had no cause to regret having entered into the partnership, which may be taken as evidence of the wisdom with which the partnership deed was drawn, and perhaps of the straits to which the Coalite Company were reduced before they found a Gas Company prepared to listen to their proposals. What the precise gain to the Gas Company is has not transpired. The Chairman spoke of "a saving in manufacturing charges brought about by . . . the proportion of gas made there by, and received from, the British Coalite Company." This is an indication that the Coalite Company are supplying gas to the Plymouth Company at a price at which the Gas Company cannot make it. This much might have been anticipated; for on no other ground, is it possible to imagine the Coalite Company being allowed a footing in the gas-works. The amount of the saving is not known. From the Gas Company's balance-sheet, it appears less coal has been carbonized, and the wages bill in the manufacturing department has been rather less than last year. But as there is no statement as to the quantity of gas sold, the figures are not of much use for purposes of comparison. Information on this point would be interesting both to those engaged in gas manufacture and to the shareholders of the Coalite Company.

Coalite Sales Prospects.

We can imagine, too, that those who are looking for profit from their investments in coalite would like to know something about the kind of market which Plymouth affords for the sale of that article. Plymouth is a place where coal is comparatively dear, and gas very cheap. There is, thus, a big consumption of gas; and, as the climate is mild, a small demand for coal for domestic use, except during a month or two in the midst of winter. It is more than likely, therefore, that coalite is not in much request, especially as it seems to be offered at a price which exceeds that of coal. In Exeter—one of the places to which the Plymouth product is exported—coalite is now being advertised for sale at 15s. for "ten large sacks," which it is said "equals in bulk, and almost equals in lasting power, one ton of coal." The actual weight of the "ten large sacks" can only be equal to half-a-ton of coal, as we do know that a ton of coalite occupies as much space as two tons of coal. Till quite recently it was the practice of the Coalite Company to exhibit in the window of its order office in Plymouth, a sack of coal and a sack of coalite, each containing 1 cwt., with the object of demonstrating that coalite is about double the bulk of coal. While the summer price of coalite in Exeter seems, therefore, to be about 30s. per ton, house coal is being advertised in the same city at 18s. 9d. and 19s. 9d. per ton by the truck load—a price which ought to permit of delivery in ton lots at from 21s. to 25s. Coalite may possess all the advantages its friends claim for it; but we doubt whether there will be a rush to purchase it at the price at which it is offered in the Devon city. As, however, a profit cannot be made on the gas, the Company naturally look for a return from the coalite.

A Cheap Gas Supply.

The reduction of the price of gas in Plymouth and Stonehouse to 1s. 8d. per 1000 cubic feet, breaks, as Sir J. Bellamy said last week, the record for the Company. For many years, Plymouth gas has been at 1s. 9d., with occasional fluctuations (owing to coal market troubles) to 1s. 10d., 1s. 11d., and once, for quite a short period during the late South African war, 2s. The general price, however, has been 1s. 9d. And if there have been increases, they have been only temporary; and the price has quickly come back to the old level. With the reduction to 1s. 8d., new ground is now entered upon. Some years ago, Sir Joseph spoke of an ambition he had to see the price of gas reduced to 1s. 6d. If there had been no municipal electric light undertaking as a competitor, the aspiration might have been realized before this, to the manifest advantage of the inhabitants of Plymouth. However, the present reduction is splendid evidence of what the Company are capable of achieving. It is the second reduction of a penny in successive half years; and as a penny represents a sum equal to the yield of a municipal rate of 2d. in the pound, Plymouth people have abundant reasons for satisfaction with the management of the gas undertaking. Mr. P. S. Hoyte, the Engineer and Manager, and his staff are to be heartily congratulated on the excellent results achieved, and the gas consumers of Plymouth on the possession of one of the cheapest supplies in the country. The Company are able to break new ground on the south side of the Cattewater estuary; and though this is not likely to yield any great amount of immediate profit, it is an enterprise which will no doubt in time meet with due reward.

Gas Matters in Manchester.

In another part of this issue there appears the summary which it is our custom to publish somewhere about this period of the year of the annual report of the Manchester Corporation Gas Committee, and the accounts of the department, for the twelve months ending March, which have been received from the Superintendent, Mr. F. A. Price. To begin with the point which is no doubt generally first looked at in connection with documents of this character—the output—it is stated in the report that the quantity of gas transmitted from the works shows a decrease of 1·29 per cent.; and this follows upon a decrease the previous year of 2·41 per cent. But these two slight set-backs are not hard to understand, when one considers all the circumstances of the case. Industrial conditions have doubtless in Manchester, as elsewhere, been somewhat short of what would have been desired; and the department has, Alderman Gibson (the Chairman of the Gas Committee) points out, felt to some extent the competition of the electricity undertaking. Brighter times may be confidently expected to bring with them greater demands; but in any case the falling off, such as it is, that has been experienced, affords no cause for despondency—more particularly when one remembers, as was stated a year ago, that the decrease follows upon the heels of increases of 3·36 per cent. in 1908, just over 5 per cent. in 1907, and nearly 6½ per cent. in 1906. And while the figures with regard to consumption may thus be looked upon with equanimity, there are other aspects of the present report which are of a distinctly gratifying character. While coal, cannel, and oil cost nearly 1s. less per ton carbonized than in the preceding twelve months, the make of gas per ton was higher—11,034 cubic feet, as against 10,962 cubic feet—and the net profit has gone up from £89,873 to £121,191. The fact that the Committee were able to buy their coal on better terms was, of course, responsible for some part of this improvement in profits; but Alderman Gibson makes the pleasing statement that the improved result in this respect was to a still greater extent due to economies of management and administration.

Some of the Figures.

To take some of the other figures given in the report, the percentage of unaccounted-for gas, it will be noticed, is on the present occasion practically the same as the previous year—the figure being 3·34 per cent., compared with 3·24 per cent. There is again recorded an increase in the number of consumers; the gain this time being 4200, making a total of 178,490. The number

of prepayment meters in use at the end of the financial year was 61,046, or an increase of 3005; and the consumption by this class of consumers—539,757,000 cubic feet—was practically 2½ per cent. more than in the preceding twelve months. The inspection of automatic meters takes place once every five weeks; and the amount taken from them last year was £75,304—represented by 18,072,966 pennies, weighing nearly 161½ tons. The proportion of the consumers who enjoy the free use of a cooker or griller still continues to increase; the figure having now reached about 45 per cent. The quantity of gas consumed by cookers in the past twelve months is estimated at no less than 656 million cubic feet—or an increase of 6½ per cent. over the previous year's figures. The number of engines in use again shows a falling off; but the quantity of gas for which this source of consumption was responsible amounted nevertheless to the large figure of 378½ million cubic feet, which was a decrease, however, of about 3 per cent. when compared with the year before. To sum up the results of the operations, the present accounts show a gross profit of £167,892, as against £140,022; while, as already mentioned, the net profit is £121,191, compared with £89,873. Of this net profit, £50,000 has been paid over to the city fund in aid of the rates, in place of the special sum of £60,000 the previous twelve months. The total appropriations for the year exceed the net profit by £8553; and towards this £149, the balance of the reserve fund, has been applied, leaving a deficit of £8404 to be carried forward. The income on the present occasion is £750,700, against £761,363 last year; the expenditure is £582,808, compared with £621,341.

Continuous Vertical Retorts for Japan.

Japan must be up to date; nothing else will satisfy. And in the matter of vertical retorts on the continuous system for the production of gas, Japan will, for the time being, occupy first place in the largeness of the productive capacity of any single installation that has yet been contracted for. The contract has recently been placed by the Tokio Gas Company with West's Gas Improvement Company, Limited; the system favoured being the Glover-West. The plant (which will be capable of producing approximately 2 million cubic feet of gas per 24 hours) will comprise 56 complete retorts, with coal and coke handling machinery, together with a suitable retort-house building. The retorts, it is understood, are to be of the same section and size as those being erected at Manchester, Rochdale, and St. Helens. The decision of the Tokio Company to adopt the Glover-West system has been arrived at after a very thorough investigation of its working by Mr. T. Uyeta, the Engineer of the Fukagawa (Tokio) Works, who has just returned to Japan after a visit of upwards of six months' duration in this country and on the Continent.

The Question of the Rates.

Another useful body of officials, in the shape of the Institute of Municipal Treasurers and Accountants, have been holding their annual gathering, and have been ventilating some subjects of importance to themselves and the communities which they serve. The President is Mr. Jabez Beckett, who, in the course of an interesting address, dealt with some topics which are at the present time the subject of wide discussion. Perhaps we may place foremost among these the question of local taxation and the increase in rate pressure, on which the President made some useful remarks. Agreeing that the onward and unchecked march of local taxation for both local and extra local services is a menacing problem, which cannot be treated any longer with indifference, he proceeded to examine the causes of this increase, for which purpose he had collected the experience of sixteen representative cities and boroughs, to ascertain: (1) The extent of the growth of rate-burdens during fourteen years, from 1895 to 1909; (2) the extent of rate-relief from gains of municipal undertakings and other sources in the first and last years of that period; and (3) the sums derived in the cases chosen from the three chief sources of rate-aid—viz., tramways, electricity, and gas undertakings. The result shows the average rates levied in 1895 were 6s. 5·64d. in the pound; in 1902, the year preceding the introduction of the Education Act, 7s. 3·34d. in the pound; and in 1909, 8s. 4·68d. in the pound—or an increase of 1s. 11d. in the fourteen years. On the other hand, the average rate-aid was in 1895 6·21d. in the pound; in 1902, 6·66d. in the pound; and in 1909, 7·14d. in the pound. If the rate-aid is added to the rates actually levied, it is found that the average in 1895 was 6s. 11·85d.; in 1902, 7s. 10d.; and in 1909, 8s. 11·82d.—or an increase of 2s. in the fourteen years. Of this increase, no less than 9·18d. is attributable to education—elementary and secondary combined. These facts, Mr. Beckett points out, lead to the conclusion that "local self-government now consumes approximately one-third of the produce of property, and will, at the present rate of progress, shortly become a grievous and insufferable burden"—an expression of opinion in which he will have no difficulty in finding others to side with him.

And Municipal Trading Contributions.

The inadequate periods fixed in many cases for debt redemption purposes was commented on by Mr. Beckett in the course of his address; and he then dealt with the subject of State aid for local authorities performing State duties. Lastly, there was a lengthy review of the vexed question of rate-relief from gains of municipal trading, and some quotations from the Salford and Glasgow Bills. Adopting the statement that the balance of advantage of a local authority raising money compared with companies formed to supply gas, water, electricity, &c., was about 1¼ per cent. per annum, he inquired whether there was any sound economic or social reason why gains from trading applied to rate-relief should exceed this limit; and also why the protection against loss from any cause should not be provided by doubly useful reserve funds. To his mind, the answers to these questions are deciding factors. "I have long," says Mr. Beckett, "held the view that the extent of advantage measured by credit should control the rate-relief; and I have seen no reason to change that opinion. I am unable to ascertain on what grounds of social justice the consumer of monopoly commodities should be subjected to a system of unrestricted appropriation of trading profits for rate-aid in common. Let the ratepayer be compensated by all means (though experience shows that public credit costs him nothing); and let him be protected by a substantial buffer—if you will, in the form of ample reserve funds, which will be available when required, and productive when not required. But his claims end here. It is true that, where the strain on the funds of a district is severe, the relief from this form of return may be highly opportune; but this contention does not carry us into the merits of the matter."

GAS ENGINEERING AND SUPPLY EXAMINATIONS.

More Successful Students.

FURTHER referring to this subject (*ante*, p. 776), we learn that Mr. Thomas Glover, of Norwich, the Examiner in "Gas Engineering," has written to Sir Philip Magnus, of the City and Guilds of London Institute, expressing regret that the results of the recent examinations cannot be published. Mr. Glover points out that great interest is being taken in these examinations by gas engineers, whose junior assistants are encouraged to pass both grades, and that the spirit of emulation is aroused by the publication of the results, which is looked for all over the country. He submits that if the results can be published as hitherto, a benefit will be conferred on the whole of the gas industry.

We have received from Mr. Robert Beynon, the Engineer and Manager of the Torquay Gas Company, the following list of students in connection with a small class conducted by his Assistant, Mr. W. E. Dean, who were successful in passing the last City and Guilds of London Institute Examinations in Gas Engineering and Gas Supply.

TORQUAY TECHNICAL SCHOOL.

City and Guilds of London Institute Examinations, 1910.

GAS ENGINEERING.

Ordinary Grade, First Class.

Bearne, Paul O.
Beynon, Frederick H.
Collings, William V.
Gorwyn, Cecil L.

Ordinary Grade, Second Class.

Samuels, Edward

GAS SUPPLY.

Ordinary Grade, First Class.

Gorwyn, Cecil L.

Ordinary Grade, Second Class.

Doidge, Percy J.
Foster, John W.
Hamer, Frederick M.
James, William H.
Mansfield, Charles F.
Vallance, Arthur S.

Mr. Alex. Smith, the Manager of the Tradeston Gas-Works, writes giving the names of three of the young men in his works who did very well in the "Gas Engineering" examinations—viz.:

William Blair	First Class Honours.
Arthur M'Donald	First Class Ordinary.
John Craig	Second Class Ordinary.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 974.)

BUSINESS on the Stock Exchange last week was about on a par with what ruled the previous week as regards persistent inactivity. But there was a marked improvement in the tone, and the firm leading markets really seemed to be leading as they should. The more speculative lines, too, were in better favour than they had been; but they did not exercise so dominating an influence. The opening day was inactive; but here and there signs of life were apparent. Government issues were mostly firm, railways were strong, and the Foreign Market good. Business on the Tuesday continued at low power. But the general tendency was cheerful, and there was a fair demand for high-class investments. Wednesday was a bit doubtful at first, but strengthened later on. Governments were good, and Consols had a nice rise. Rails maintained their position; and the rest were quiet and mostly firm. This improving tone continued on Thursday, and Consols had a further advance. On Friday, there was a move to secure profits; and realizations had the effect of putting Consols down ⅛. There was some irregularity in other markets. Business was very quiet on Saturday. The tone was much the same as the preceding day; and prices accordingly closed rather lower. In the Money Market there was a very fair demand; but discount rates continued to ease away. Business in the Gas Market was only moderate, scarcely up to the level of the week before. Few quotations made any change; but the general tendency was very firm, and two or three important issues advanced their figures. In Gaslight and Coke, the ordinary was not quite so active, but quite strong; and, after one small bargain had been marked at 103¾ free, it hardened from 104 up to 104¾—a rise of ½. In the secured issues, the maximum realized 89⅝ and 89¾, the preference from 105 to 105⅞, and the debenture 82. A couple of transactions in South Metropolitan ordinary at 121¼ and 121¾, and one in the debenture at 82, were all. In Commercials, there was only one in the 4 per cent. at 108½. Among the Suburban and Provincial group, there were dealings in Alliance and Dublin at 82¾ and 83¼, Brentford old at 253½, ditto new at 189, British at from 43¾ to 44½, Hastings and St. Leonards 3½ per cent. at 93¼, and South Suburban at 121⅛. In the Continental companies, Imperial was rather quiet, but strong, at from 178 to 179 (a rise of 1), European fully-paid made 24¾, and Union 94—a fall of 1. Among the undertakings of the remoter world, Bombay realized 6⅛ and 6¼, ditto part-paid 4 15/16, Monte Video 12½ and 12¾, Primitiva from 7¼ to 7 3/16, ditto preference from 5⅜ to 5½, ditto debenture from 97¼ to 98¾, and San Paulo 15⅝.

ELECTRICITY SUPPLY MEMORANDA.

Municipalities and the Electrical Industry — Depreciation — Free Lamps—Basis of Charge—Exhaustion of the Gas Industry as a Competitor—Flame Arc Lamp Fumes and Shop Windows—Lightning Effects.

THE Incorporated Municipal Electrical Association has held its annual meeting under the presidency of Mr. W. W. Lackie, of Glasgow. His presidential address was variegated in subject-matter. It treated of the vexed questions of municipal supply, depreciation, lamp renewals, and charges. For municipalities, the President claims that they have done much to advance the electrical industry. This depends on the municipalities to whom he is referring. They are not all like the Glasgow Corporation. If we look back at the mad rush in the eighties and early nineties on the part of local authorities to enter into electricity speculation—a rush that has had in many cases disastrous results to the ratepayers, and to those manufacturing firms who were dazzled by the fictitious security created by the magnificent temporary demand for plant that came rolling to them—then we can admit as true that municipalities have done much to advance the electrical industry to a long succession of lean and profitless years, the end of which is not yet within sight. Regarding depreciation, Mr. Lackie holds that depreciation of value is met by the sums set aside for sinking fund, if—much virtue is there in an "if"—properly calculated. Decreased efficiency, however, should, he submits, be met by depreciation if the ordinary maintenance chargeable to revenue is not sufficient to keep the plant in its first state of efficiency. Obsolescence is not true depreciation; but it is quite possible that a prudent authority owning works might look to the advantage which would be gained by installing present-day plant, and so getting greater efficiency than would be obtained from antiquated plant. Such an authority would annually lay aside a sum for this purpose, and might be found dispensing with old plant in favour of something more up to date, even although the latter might not have reached the end of its usefulness. Such a course, however, is not compulsory under the Electric Lighting Acts, nor is it legal to create a deficit by setting aside a sum either in the name of depreciation or reserve.

Turning from these matters of administrative policy to others in the commercial category, the President is found taking extreme views. We are often having electricians butting at indifferent lighting by incandescent burners through the neglect of consumers. This is one of their old business-getting dodges. But here is Mr. Lackie telling us that "frequently" bad electric lighting is found to be entirely due to using defective lamps. The "frequently" and the "bad" should be written large, seeing that "much could be said in favour of the supply authority providing the consumers with lamps." There is no question about the President being struck with the seriousness of the position in regard to electric lamp neglect and renewals; for he concludes his argument on the point, satisfied that in the end it would be for the best welfare, not only of the supply undertaking, but of the wiring contractors, if the lamps were left to the supply authority, either to be furnished and the price included in the charge per unit, or be sold direct to the consumer by the authority. If the former method were adopted, Mr. Lackie suggests that one lamp might be given for every 100 or 200 units used; and if the latter the price would be at most net cost.

On the general question of charge, it has for many years been a complaint in the electrical industry that the unit on which prices are based is so small that there is not the same flexibility in the matter of variation in charge that there would be if the basis of charge were of greater magnitude. Therefore we have Mr. Lackie saying that the time may be approaching when, instead of charging a rate per unit, the charge will be at so much per ten units. This would enable fractional reductions to be made smaller than the minimum possible reduction of ¼d. per unit with the existing method of charge. The present rates in Glasgow vary from 3½d. to ¾d. per unit; so that, if Mr. Lackie's basis of ten units were adopted, the price would work out at 2s. 11d. for light and 7½d. for power. If such a change comes about, the gas industry must take care that the public are not misled into thinking that ten units of electricity for domestic lighting are the equivalent of 1000 cubic feet of gas used in the incandescent burner—inverted or otherwise. There will be absolute agreement with Mr. Lackie in saying that the first duty of a supply undertaking is to see that all classes of consumers pay their due share of standing charges on capital expenditure necessary to provide plant to supply them. Under the shelter of that useful creation the "load factor," how often is the "first duty" abused by electricity suppliers!

Among the papers read were two respectively by Mr. A. C. Cramb, of Croydon, and Mr. H. Collings Bishop, of Newport, Mon., on that ever-absorbing subject business development. But there does not appear to be about the papers anything striking one as original. It is thought by Mr. Cramb that the commercial methods of electricity undertakings have been altogether inadequate; and he advocates the provision of a sales staff that would about wipe out the profits of many an undertaking fortunate enough to have any. He is a little envious of gas companies. The prosperity of these is, of course, a thorn in the side of the electricians; but Mr. Cramb would have us believe that his envy is due to another cause. It is obvious that he does not know the gas industry, in which there is a continual working to produce reductions of price; for he accuses the companies of using large sums of money that should go to the public in reduced prices for fitting up houses free, or nearly so, and in doing a great deal of work for the public with a view to keeping out the electric supply undertakings which generally have not such powers. Mr. Cramb does not appreciate the importance gas companies attach to the lowest possible price of gas, nor how much the dividends of many gas companies depend on low prices. He says nothing about the powers of electricity companies, nor of the liberty in the matter of electricity prices that municipalities possess, and gas companies do not; and there is no mention of the fact that the greater number of houses fitted up free by gas undertakings come under the prepayment system, charges in connection with which are allowed to be made to cover the capital costs incurred in installation.

But why should Mr. Cramb complain, when Mr. Collings Bishop (whose undertaking at Newport, Mon., has not an enviable record of financial prosperity) says that gas competition "does not exist to nearly the same extent that it did a few years ago. It is now strenuous fighting on the part of our rivals to prevent consumers migrating to a really healthy illuminant." "The competition, too, in street lighting is dead." "One is also able now to attack that stronghold of the gas company—heating." May Heaven defend the gas industry! And yet, by-the-by, we saw Mr. Thomas Canning, the Engineer of the Newport Gas Company, smiling the other day, and looking as though he had not a single care on his shoulders. In contrast with the volatile Mr. Bishop, Mr. Alderman J. Crowther and Mr. C. H. Wordingham are not so foolish as to attempt to underestimate the strength of gas competition. The former, in the discussion of the papers, said he considered gas competition as likely to be more severe; and that in Sheffield the price of gas was likely to fall as low as 11d. per 1000 cubic feet. Mr. Wordingham, too, felt that vigorous efforts on the part of electricity suppliers were required to secure custom. It is refreshing to meet such a fine specimen of an exuberant optimist as Mr. Bishop must be; but really it is not good policy ever to undervalue the strength of one's competitor. The puerile utterances of Mr. Bishop have attracted the attention of the "Evening Post" published in Newport; and in noticing them editorially, it is remarked: "We hold no brief for the Gas Company. But we have some concern for truth and for facts; and Mr. Bishop is living in a fool's paradise if he really believes gas competition is dead, or even dying." Wrinkles may be taken from a competitor. It perhaps is worth noting that Mr. F. Ayton, of Ipswich, always works hand in hand with house agents, in order to keep in touch with removals and new tenants, as he

finds much custom is obtained by being on the ground before the gas people. From which one gathers that, should unfortunately the gas people be first, the electric people stand a poor chance. A further note might be made of Mr. Cramb's information that national advertising schemes are being considered by the London Joint Publicity Committee, and something will shortly be done in this direction.

Flame arc lamps are objectionable things to use inside shop windows; and, in our opinion, elsewhere. Their concentrated brilliance is a drawback; their giddy behaviour is annoying. But used in shops, the fumes evolved by the carbons cause a deposit on the windows, which one man has tried to remove by using various acids and alkalis. But all to no purpose. The deposit (if such it can be called) sticks fast. In his trouble he recently addressed a letter to the "Electrical Review," inquiring if anyone else has been similarly worried, and whether discovery has been made of some means of effecting a cure. There has not been a rush of information on the subject, either because people do not like talking of the defects of their goods, or because in many places arc lamps are giving place to metallic filaments, and people see no reason for troubling about things that are already falling into desuetude. But one correspondent says he does not think carbon deposit has anything to do with the matter; it is more likely the fluorine gas emitted from the carbons attacks the glass, actually etching the surface. "If a clear globe is used with these lamps, practically the whole of the interior very soon becomes frosted. This is a serious objection to the flame arc lamp, as, in order to maintain its efficiency, globes must be frequently renewed." Another correspondent thinks that what various acids and alkalis will not accomplish, "Monkey Brand" soap will. He finds this good for cleaning the globes of arc lamps; and he advises a trial of it on the windows. But suppose the surface has been "etched" or "frosted"—how will "Monkey Brand" avail?

Lightning has a bad reputation among incandescent electric lamps. A correspondent in the same paper tells the story of how "several" consumers in his district had the filaments of their lamps broken during one of the heavy thunderstorms lately. The supply is on the three-wire direct-current system with middle wire earthed at the station, and the voltage 230. In one case lightning struck the front garden of the house, and overthrew some heavy rockery; and although the lamps were not alight at the time, it was found upon going to light them, that the filaments of two of them were badly broken, but no fuse had blown. In another case three lamps failed, although not alight; and in one of them the leading-in wires were twisted out, so that they almost touched the glass. In this case also, no fuse had blown. A third and very similar case occurred in quite a different part of the town. In neither case did damage result to flexibles or other parts of the installations. Happenings like these are rather disconcerting.

NOTES FROM WESTMINSTER.

The Standard Burner Bills Pass their Second Reading.

ALL eyes interested in gas at Westminster were on the House of Commons last Thursday, when the Standard Burner Bills were up for second reading; and the long anticipated discussion took place. The restricted interest taken by honourable members in the matter was shown by the comparatively thin House during the discussion, and the smallness of the figures representing the voting on the motions for the second reading of the measures. The debate is reported in "Parliamentary Intelligence" to-day, and comment is made on it in the leader columns. All that it is necessary to say here is that Bills Nos. 1 and 2 were read the second time on separate divisions; and on Friday the opposition to the second reading of No. 3 Bill was withdrawn. An instruction, however, is to be given to the Committee who will deal with the Bills (in accordance with a motion by Sir Daniel F. Goddard) that, on the request of any of the petitioners, consideration is to be accorded to the question of the expediency of dividing the Bills, in order to remove any difficulty that may, in their opinion, be proved to exist. It is thought, for instance, that the Liverpool Gas Company might, owing to their special circumstances, be dealt with independently; and, as a matter of fact, Mr. Holt, who had on the paper a motion for the second reading of the Bill being deferred to "that day three months," withdrew his opposition on that understanding. The Board of Trade rather favoured this separate treatment of Liverpool. It will, however, be seen from remarks made by Mr. Illingworth—particularly those made just before the House divided on No. 2 Bill—that the Board of Trade distinctly approve of the No. 2 burner, "in order to secure an absolute standard of uniformity in regard to gas in all parts of the country, and to make comparisons possible in the interests of the economy and usefulness of the article produced." We are obliged to the opponents of the Bills for securing for the gas industry, from the Government Department chiefly concerned in the matter, this important pronouncement. It is probable that this week the Committee will be selected to whom the Bills will be referred, and that an early date will now be named for consideration of the measures.

Second House Oppositions. A group of Bills have been referred to a House of Lords Committee, with the Duke of Bedford as Chairman. Among them is the Glasgow Corporation Bill, which in the House of Commons had its gas part so altered that the gas undertaking is to be run for the benefit of the consumers in the area of supply and of the gas undertaking generally; while those ratepayers who do not contribute to the making of profit are not to participate in the enjoyment of it. There is justice in this. The opposition that the Bill will have to meet in the Lords is not likely to be very severe—the most contentious matters having been disposed of in the House of Commons; and the Corporation having wisely submitted to the situation then created. The Brighton and Hove Gas Company's Bill is in the same group; and here the local authorities are opposing through their dissatisfaction with what they obtained in the Commons. Like the celebrated Oliver, they want more; and it is their greed that is going to impose some additional expense—and we firmly believe some fruitless expense—on the ratepayers of the district. The policy of electricity-owning municipalities like the Brighton Corporation appears just now to be to inflict as many disadvantages as possible upon their gas competitors. Besides not allowing them any favour, they will not permit them to have a fair field. The hearing of the case in regard to this Bill commenced on Friday; but reference to the proceedings may be deferred for a week.

A Territorial Question. There has been but a small amount of interest, until the past week, in the Committee rooms since the recess that a much-harassed Parliament badly needed, which recess unfortunately was prolonged by the national calamity. Proceedings have since been of a spasmodic character. Only one matter prior to last week requires notice, to maintain continuity of record here; and that has been already reported in our "Parliamentary Intelligence." It is the success of the Shirebrook and District Gas Company in annexing fresh territory for gas supply; but it has only been done by arrangement (on as yet unknown terms) with the Mansfield Corporation, who have held powers of supply in Warsop. There was dispute over the area that it was desired to take in. Part of it is also within the defined limits of supply of the Bolsover Gas Company. But neither the Mansfield Corporation nor the Bolsover Company had taken steps to furnish gas to the parts that the Shirebrook Company are willing and anxious to take in hand. The Warsop local authority thought that they could supply themselves, on the Shirebrook Company pointing out to them that the Warsopians lacked, and grievously felt the need of, a supply of gas. The fact had never been made so plain before; and thereupon the local authority moved to get possession of powers of supply for themselves by way of Provisional Order—visions possibly of big profits rising before them. But after a Local Government Board inquiry, the powers that be at Warsop were informed, as politely as the Board could do it, that they could not for Warsop run a separate gas-works economically, and so their application must be refused. Thus the Shirebrook Company, subject to the arrangement with Mansfield, get their district extension.

Gas-Works and Smoke. The dusky exhalations of the combustion of coal and certain other solid substances are in themselves somewhat uninteresting to the ordinary being, but somehow or other around the effects of smoke popular interest can always be created. Smoke occupied a great deal of consideration at the hands of one of the sections of the Local Legislation Committee during the past week; and the Gaslight and Coke Company and the South Metropolitan Company (acting in concert) supplied, through Mr. Corbet Woodall and Mr. W. Doig Gibb, evidence on the subject that ought to show gas undertakings generally in a good light in regard to smoke, in a double sense. The London County Council are wanting to obtain more stringent powers respecting the smoke nuisance. They have found (among other factories) electricity generating stations fearful sinners in the matter of emitting smoke from their shafts. But as the law stands, the Council claim that they cannot effectually combat the evil from these and other sources (as the Lot's Road generating station case illustrated), because they have to prove that the smoke was "black," whereas smoke of quite another colour may be exceedingly deleterious, and as great a nuisance as that which is black. They therefore desire amended powers. Mr. Balfour Browne, K.C., strongly urged that the change might prove very onerous to the gas companies in meeting their statutory obligations, through temporary and accidental breaches of the proposed modified law—such as when charging and discharging retorts, when a fracture occurs in a retort, and when quenching coke. The learned Counsel and Mr. Woodall and Mr. Gibb averred that gas undertakings generally bear a very clean record in respect of smoke nuisances—in fact, as Mr. Woodall puts it, gas undertakings are very sensitive and jealous over the character of their works in this matter. And their very work does much towards contributing to the abatement of the nuisance from domestic and factory chimneys. Some figures quoted as to the smoke-preventing connections of the Gaslight and Coke Company are of more than ordinary interest. The Company have now about 150,000 gas-fires, 430,000 cooking-stoves, 6000 to 7000 water-circulators, and an enormous quantity of incidental apparatus linked up to their system—all of which means the displacement of so much solid fuel. And they do not take into account the privately owned fires and stoves. It was, too, a good point that Mr. Woodall made, as to the opposition last session of the West Ham Corporation and the inhabitants to the removal of the local gas-works from their midst, and as to the consequent compulsion placed on the Company to keep those works going in substantially the same degree as now for ten years, so loth are the people in the area to part with their presence. What it comes to is this, that

if the qualifying term "black" is deleted, London gas-works will be subject to prosecution for effects that are unavoidable in the course of their operations; and Mr. Balfour Browne submitted that there ought to be protection in the way of duration of emission, in order to exclude inadvertent short-period lapses. The County Council representatives object to special protection being given to different interests, as by so doing local authorities, they contend, will be placed in great difficulty. More of this, however, in the next "Notes."

Garnant Gas. It seems impossible to get away from the echoes of the Amman Valley trouble. The Garnant Gas Bill has been before the Unopposed Bills Committee; and it transpires that it is a promotion of the Directors of the Ammanford Company, who are the successors of the Amman Valley Company, under powers of purchase granted by Parliament, and a price determined by Mr. Charles Carpenter, the Arbitrator named by the Board of Trade. Garnant is a district bordering on that of the Ammanford Company; but there seem to be various obstacles to the latter Company taking up the supply, and hence the proposal for a new and distinct Company. It was rather a significant question that the Chairman of the Committee addressed to Mr. E. Herbert Stevenson: "Do you not think it is very enterprising of these Directors, before they have had their existing powers one year, to form a Company for Garnant?" The reply was: "Well, it is a district that must have gas." But there was evidently some little doubt lurking in the minds of the Committee; for they cut down the proposed capital of £18,000 to £10,000, and made the maximum price 4s. 3d. per 1000 cubic feet.

Water Supplies Protection. It will be seen from our "Parliamentary Intelligence" that we are reporting liberally the proceedings before the Joint Committee of the Lords and Commons on the Water Supplies Protection Bill. The Committee are giving the representatives of the water authorities of the country every opportunity for stating their case against the Bill, and that they have cause for complaint on all points of the measure must have been ere this made perfectly apparent to the Committee. If it has not been, then there would be ground for despair of ever showing the Committee that right is not by any means altogether on the side of the promoters. But the Committee have not yet finished hearing evidence; and when they have done, we fail to see how any Bill can result that will please the irreconcilable interests. It must be nothing short of a miracle if the Committee succeed in producing such legislation.

Water Loan Periods. The Fylde Water Board Bill has been before a Committee of the Commons, presided over by Sir Luke White; and the most interesting point was the question of the time-limit for a loan for the construction of the Grizedale Lea reservoir. The Board wanted to extend the time from thirty to sixty years; but the Local Government Board objected on the ground that it would create a precedent. A reservoir, if properly constructed, is a thing that may be regarded as practically a permanent structure; so that the attitude of the Local Government Board is not altogether reasonable, especially as it is proved that the financial burden will fall heavily if the shorter period is insisted on. The Committee would not alter the period; but they expressed their unanimous opinion that this was a case in which the Local Government Board might have reviewed their decision, and suggested that the Water Board should appeal to the central authority for the reconsideration of their case so far as this particular loan is concerned. In regard to other loans, the Committee granted fifty-five years, instead of sixty years, for the repayment of money for the purchase of land, reconstruction of a covered service reservoir, &c.; and forty years, instead of fifty years, for loans for the construction of aqueducts, high-level mains, and the extension of the existing mains.

A Result of Popularity. The Southend Water Company have considerable difficulties to contend with, and something of their nature was gathered when the Company's Bill for additional powers was before Sir Luke White's Committee. It should be mentioned that the Company want the sanction of Parliament to certain wells already sunk in the area of supply, and to the construction of fresh wells, and power to raise new capital to the extent of £250,000. In 1891, the population of Southend was only about 13,000; to-day, it is, in round figures, 62,000. The summer population is estimated at 100,000; and "trippers," to as many as from 60,000 to 70,000, favour Southend with their attentions in a single day. It can be imagined, with such a variable population, the task of supplying water to the area is not by any means a light one, and it is expensive, more particularly as the Company have to sink all through the London clay (which goes down 250 feet on the western side, and 460 feet on the eastern side). The wells have to be sunk to the depth of 700 to 1000 feet; and their average cost is about £18,000. The Committee found the preamble of the Bill proved.

Water for Motor Cars, &c. A note may be made on a matter that is of importance to water authorities generally. The Bradford Corporation have in their Bill a clause giving them power to make a special charge for water used for washing carriages and motor cars; and, on the third reading of the Bill in the House, there was an attempt to amend this provision, in order to cause such use of water to be regarded as a domestic purpose. The amendment was negatived.

Another Water Supply. The question of the water supply of the Monmouthshire Valleys has been a much-debated one now for several years, and the County Council two years ago unsuccessfully brought before Parliament a scheme that it was thought would relieve the district from all further trouble. Owing to the scheme being abortive, a Bill has been introduced this session which again deals with the matter. Its intention is to constitute a Water Board, consisting of representatives of the Councils of Abertillery, Abercarn, Risca, and Mynyddislwyn, and to authorize them to construct new water-works, and take over those of the Councils mentioned. Abergavenny opposed, believing that, in some peculiar way, their supply will be affected. The new Water Board propose a reservoir in Brecknockshire; and in carrying their main to the sources of supply, they will pass within ¾ mile of Abergavenny, and will have to go under two streams which are tributaries of a brook from which Abergavenny are entitled to take their water. This they allege would injure their supply. Mr. Baldwin Latham denies this; and Mr. Rofe says he has never known a case in which special protection has been asked for in regard to such trifling matters. The Committee allowed the Bill to proceed; but a clause drafted for the protection of Abergavenny was declined by that nervous body.

RETIREMENT OF MR. H. KING HILLER, OF SHANGHAI.

An interesting function took place on Saturday, the 4th inst., at the offices of the Shanghai Gas Company, Limited, at Shanghai, China; the occasion being a presentation by the staff to the retiring Engineer-in-Chief, Mr. H. King Hiller.

Mr. Hiller has been seventeen years in the service of the Shanghai Gas Company, for fifteen of which he held the position of Engineer-in-Chief. During this time he has seen the annual make of gas increase from 95 to 522 millions, and the capital of the undertaking from 300,000 to 2,528,000 taels. The labour entailed in the design and construction of the necessary manufacturing and distributing works to meet this great increase has naturally been very large—especially as England (the base of supplies) is 10,000 miles distant.

The original buildings and plant have been entirely done away with; the work of rebuilding having been commenced immediately after Mr. Hiller's appointment as Engineer, when a section, consisting of a complete works for the manufacture of a million cubic feet of coal gas per day, was put in hand. This was supplemented later on by an installation of carburetting water-gas plant for about half-a-million feet per day. Within the past five years, a further coal-gas section of a million feet per day, with electrical charging and discharging machinery, has been added, together with a carburetted water gas section of a million-and-a-half feet capacity in substitution for the original water-gas plant. At the present time, therefore, the works have a capacity of over 3 million cubic feet per day. The storage consists of three spiral-guided gasholders—one of half-a-million and two of over a million feet each. The latest of these is an annular steel tank placed above ground, the interior of which is used as a store for tubes, fire-clay goods, &c.

The distribution system is supplied through four district governors. The gas for one of the out-districts being pumped through three-and-a-half miles of 6-inch steel tube at a pressure of 10 lbs. per square inch; while during the peak of the load in the central district, the necessary pressure is maintained by a Sturtevant "Tube-Pressure Raiser," driving the gas through about two miles of 12-inch high-pressure cast-iron main, which is connected at two points to the low-pressure system by underground governors.

Mr. Hiller's relations with the European and Chinese staff have always been of a very cordial nature; and the send-off accorded to him was of a most enthusiastic character, in which all grades took an active part. On the occasion referred to, Mr. F. W. Potter—then Assistant, but now Engineer-in-Chief—in a felicitous speech, presented Mr. Hiller, on behalf of the staff, with a massive rose-bowl of the highest Japanese silversmiths' art, suitably inscribed; and he invited all present to drink to the departing Engineer's health and prosperity. The toast was received with acclamation, and Mr. Hiller replied, thanking them all for the honour done him, and referring to the long period during which he had been so amicably connected with the staff.

Mr. Hiller's departure from the works and jetty to join the mail steamer "Empress of Japan" for Canada, was accompanied with salvoes of bombs and crackers, after the most approved Chinese fashion.

We understand that Mr. Hiller is returning to London, where he purposes entering into consulting practice, as his long experience of the conditions of gas-works construction and management in a sub-tropical country should prove of service to those having works abroad. A successful career for him seems well assured.

The New York Section of the Illuminating Engineering Society held their annual meeting in the Engineering Building on the evening of the 9th inst. Dr. Arthur H. Elliott was elected Chairman for the ensuing year; Mr. A. J. Marshall was re-elected Secretary; and Mr. L. R. Hopton and Mr. Rhoaes, Managers. Dr. C. H. Sharp read a paper on photometric units.

SOCIÉTÉ TECHNIQUE DE L'INDUSTRIE DU GAZ EN FRANCE.

THE THIRTY-SEVENTH ANNUAL CONGRESS—Paris, June 20 to 23, 1910.

REVIEW OF THE PROCEEDINGS.

[From Our Own Correspondent.]

In brilliant sunshine, and with a high temperature, the Thirty-Seventh Annual Congress of the Société Technique de l'Industrie du Gaz en France was opened on Monday last week in the hall of the Society of Civil Engineers of France, Rue Blanche, Paris, by M. Godinet, the General Manager of the important group of gas undertakings in the hands of MM. P. de Lachomette, Villiers, et Cie., of Lyons. M. Godinet had on his left M. Marquisan, the Vice-President, and on his right M. Visinet, a Past-President. There was a good attendance of members; among those from London being Mr. R. S. Gardiner, Mr. W. B. Brady (General Secretary of the European Gas Company), and Mr. E. C. Bode, of L'Union des Gaz Company.

General Meeting.

The first business, which was taken shortly after nine o'clock, was the presentation of the report of last year's proceedings at Lyons, as contained in the volume of "Transactions;" and it was adopted unanimously. Then came the admission of new members, of which there were upwards of fifty in the two classes of members and associates—the majority, of course, being in the former class. Mr. J. W. Helps, the Past-President of the Institution of Gas Engineers, was elected an honorary member of the Society; his name—which was submitted by the President, with an appreciative reference to the hospitality shown by the Institution on the occasion of the visit of the Society to the Franco-British Exhibition—being received with loud applause. He also mentioned that the President of the Society had been elected an honorary member of the Institution. The President then read the report of the Committee, the greater part of which was devoted, as usual, to records of the life-work of the members who had passed away during the year; reference being made to Mr. W. A. Valon, who, as a President of the Gas Institute, was one of the honorary members. At the close of the year, the total membership, including those just admitted, was 798, consisting of 22 honorary, 636 ordinary, and 140 associate members. Reference was also made to the relinquishment of the position of Permanent Secretary by M. Payet, and the appointment of M. Henry Bouron, formerly Manager of the Bucharest Gas Company, as his successor. Next came the report of the Treasurer (M. Frère), which showed that the revenue last year was 68,172 frs. (£2727), and the expenditure 61,150 frs. (£2446). The latter included 8683 frs. (£347) for prizes and 1462 frs. (£58) for investigations and for the library. At the close of the year, the Society's capital amounted to 209,271 frs. (£8371), compared with 203,453 frs. (£8138) at the corresponding period in 1908; being an increase of 5818 frs. (£233). The reports were unanimously adopted.

The President having congratulated Mr. R. S. Gardiner, a Member of the Committee, and M. Séguin, of Le Mans, on being admitted to the order of the Legion of Honour—his remarks being cordially received—an extraordinary meeting was held to consider a report by the Committee on certain proposed alterations of the rules, with the result that it was adopted unanimously. The changes proposed had been necessitated by the growth in the membership of the Society, especially from what may be called outside sources, which it was thought should be represented on the Committee. Under the new arrangement, this is increased to 21 members; and there are three Vice-Presidents.

The meeting then proceeded to ballot for members of the Committee, of whom five were retiring. Several additional names were proposed, and the result was the election of MM. Boutan, Rouland, and Laurain for three years; of MM. Masse and R. Ellissen for two years; MM. Koechlin and Guillet for one year; and the re-election of MM. Monthiers, Villiers, Gaston Gautier, and Kaeuffer. This brought the business of the general meeting to a close.

Opening of the Congress.

At the afternoon sitting, the Congress was formally opened by the President, who announced that the "bureau" for the year 1910-11 would be as follows: President, M. Marquisan; Vice-Presidents, MM. Boutan, Rouland, and Delebecque; Secretaries, MM. Gaston Gautier and Kaeuffer; and Treasurer, M. Frère. The President also announced the attendance of M. Sorné, in the capacity of delegate of the Minister of Commerce and Industry, for the purpose of presenting the medals awarded by the Government to gas-works employees for long and meritorious services. Having discharged this duty, he expressed the great pleasure it gave him to be present. Next came the distribution of the Society's medals and premiums for similar good conduct—the services of one from Strasburg, who had retired and been overlooked, coming in for recognition. Attention was afterwards directed to the prizes awarded by the Society for papers read at last year's Congress. They were as follows: To M. Hovine, for his communication describing his recuperative furnace having an arrangement for eventually heating by tar, 250 frs.; to M. Teulon, whose paper dealt with the extinction of coke at the Marseilles Gas-Works, 250 frs.; to M. Ramassot, for the description of his water heater, 200 frs.; and to MM. Boissonnas and François, who made contributions to the proceedings at the Lyons Congress—the former on the conveyance of electric energy from the Alps to Lyons, and the latter on the use of tar on roads—a silver plaquette each. Reports were then read on the distance lighting of gas-burners and on the appliances presented in competition for the Society's prizes for the present year. An announcement by the President that next year's Congress might possibly be held at Bayonne brought this portion of the programme to an end.

Attention was then given to the technical communications, of which there were no less than twenty; some of them, of course, being quite short. The first taken was one by M. Parsy, on "The Klönne Chamber Settings." It was an important communication, and was accompanied by nine folding plates.* It gave rise to an interesting discussion, in which MM. Mallet, Grebel, Heeley, and Laurain took part. M. Mallet wished to know why the firm of Klönne prefer the horizontal to the inclined chamber settings. M. Parsy replied that, though the results are nearly the same with the two systems, the inclined chamber settings require the use of a special kind of coal in order to prevent clinging of the material to the sides; and, moreover, they cost 30 per cent. more than the horizontal chambers. M. Grebel remarked that for distilling coal in large quantities the modified coke-oven was specially suitable; and he added that the gas and metallurgical coke industries are destined to amalgamate. M. Heeley spoke in favour of the inclined chambers of M. Ries. M. Laurain offered some observations of an historical nature concerning the Pauwels and Dubochet furnaces referred to early in the paper. M. Mallet generally confirmed the remarks of M. Grebel. He recalled the fact that the Pauwels furnaces were heated from below. The charging and discharging of coke-ovens and chamber settings did not, he said, present any difficulty. With regard to the use of a conveyor, this was much easier than with vertical retorts, as the bulk of coke is discharged from the chamber in some two to three minutes. M. Parsy replied to the several speakers; and, after a few remarks from the President, the discussion closed.

M. Camille Roche then read a paper on the regulation of the output of a gas-generator furnace. It bore upon the subject of one presented at the Paris Congress of the Society in 1908. A few remarks were made upon it by the President, M. Marquisan, and M. Grebel, and then M. R. de la Boulaye read a paper describing the double charger-discharger system of M. de Brouwer. By this time there were very few members left in the hall. On the next paper on the programme—one by M. Foillard on the electric dischargers of the Paris Gas Company at Le Landy—being called, the author was not present; and it was passed. The next subject set down was a discussion on the quenching of coke; but as the wish of the members was that it should be deferred till next morning, the sitting was brought to a close shortly after five o'clock.

The business on Tuesday morning was of a somewhat mixed character. It opened with the paper by M. Foillard, on the electric dischargers of the Paris Gas Company; and as no one seemed inclined to offer any remarks upon it, the President invited discussion, not only on this paper, but on that of M. Boulaye of the previous day, as well as on the subject of the extinction of coke. The invitation as to the papers was not accepted; but in regard to the subject mentioned, M. Teulon furnished a little additional information as to his work in this direction at the Marseilles Gas-Works, and stated that new plant will be put down next winter. Then came a paper that gave rise to some controversy. M. Bonnet submitted a communication on the gasholders with curved metal tanks of the Maschinenfabrik Augsburg Nürnberg; supplementing it with diagrams on the blackboard and explanatory observations. He claimed for the new system its adaptability for gasholders of 700,000 cubic feet capacity and upwards, but especially for those of larger dimensions, on the score both of good construction and economy. The President thanked M. Bonnet for his paper, and asked him to send his additional figures to appear in the "Transactions." He invited discussion; and M. Bonnet found an opponent in M. Leclaire, who practically read another paper on gasholder construction, with blackboard diagrams and formulæ and a blue print. M. Leclaire was talking rather at large when the President reminded him that the matter then in question was the weight of the tank; and M. Mallet remarked that the question under discussion was too mathematical, and could not be followed by those present. M. Leclaire dissented, and said the matter was only common sense. However, he would say no more, but leave the members to judge for themselves.

* An abstract translation of the paper will be found on p. 949.—Ed. J. G. L.

At this point, M. René Masse, the Engineer of the Société d'Eclairage, Chauffage, et Force Motrice, whose new works at Gennevilliers were to be visited in the afternoon, arrived, and, with the aid of a large plan of the works, indicated the course the visitors would take so as to see as much as possible in the minimum of time, and gave some explanatory details in regard to the works. The thanks of the members having been accorded to him, the technical business was resumed.

M. Grebel read a paper on condensation, in which he described his system, which he was tempted to call a "revolution," inasmuch as it would cause the suppression of foul mains, condensers, washers, naphthalene traps, and battery condensers. M. Sainte-Claire Deville spoke at some length on the subject—giving what was practically a lecture upon it. This distinguished scientist does not appear to be a partisan of condensers, with washing of the gas by the tar, for the arrest of the naphthalene. He evidently prefers his own system, which consists in cooling. In his reply, M. Grebel said M. Sainte-Claire Deville thought that naphthalene could not be arrested at average temperatures, in consequence of the high maximum vapour tension. But the tension of dissolution must also be considered; and in the case of methodical washing, this was very much smaller than the maximum tension. M. Cornuault, referring to the Feld process, which had already been mentioned, said if it was not quite perfect yet, it very soon would be. He knew of a case in which it was to be adopted.

This brought the sitting to a close; and the afternoon was spent at the Gennevilliers Gas-Works. Reference to the visit is made elsewhere.

On Wednesday morning, the first paper taken was one by M. Bromham, on the use of a turbine in the production of sulphate of ammonia. Questions as to entrance and exit of the sulphate were put by M. Mallet and the President; and the author agreed to furnish some additional particulars. Next came a paper by M. Camille Roche, on the use of aluminium in gas-works, on which a few observations were made by MM. Mallet and Bouvier. M. F. Chevalet followed with a paper on the treatment of ammoniacal liquors in small gas-works. It appeared that the author had cited figures which it was thought could not be arrived at elsewhere; and the Committee of the Society will judge of the advisability of the paper being withdrawn. M. Dupoy followed with a paper on the alteration of ordinary meters into constant-level meters by means of a compensator furnished with an injector. No remarks were made upon the paper, nor upon a report by the Committee (read by M. Bouvier) as to the precautions to be taken in the employment of mixed gas and electricity appliances. M. Vanderpol submitted a paper (to which he made some additions) on obtaining perfect combustion of gas by means of the previous admixture of gas and air. M. Bouvier, who has given much attention to this subject, offered some remarks on the economy resulting from the pre-mixture of gas and air, which assures high temperature and the best combustion. An interesting paper was submitted by M. Greyson de Schodt, on inclined incandescent burners, which he claimed give much better illuminating results than those in the upright position. [See p. 951.] The only other paper taken was by M. Méker, who described an appliance for heating bakers' ovens by gas. One of them was on view in the vestibule of the meeting-place. M. Bromham offered some remarks on the paper, and called attention to a gas-heated oven on view at the Brussels Exhibition.

M. Laurain, the Chief Engineer of the Société du Gaz de Paris, furnished, by the aid of two large plans, some particulars in regard to the works at Le Landy, which were to be visited in the afternoon. He was warmly thanked for his interesting remarks; and the sitting closed.

On Thursday morning, the technical business was preceded by an acknowledgment by M. Séguin, the Manager of the gas-works at Le Mans, of the appreciative remarks made by the President on the opening day in reference to his receiving the decoration of the Legion of Honour. Then came a paper by M. Cramer on inverted incandescent burners in general, and on the improved "Mars" gas-burner (which was on view in the vestibule of the meeting-place) in particular. There was only one question put in connection with this communication. It was by the President, and had reference to the pressure at which the burner works. M. Grebel was then called upon for the second paper standing in his name, on the subject of his reflectors for economizing light. Before reading it, he began to offer some remarks in reply to M. Sainte-Claire Deville's observations on his previous paper; but the President pointed out that this was scarcely permissible in M. Deville's absence, as no reply could be made by him. Nevertheless, he allowed M. Grebel to add some particulars as to his communication. He then indicated the nature of his second paper, without actually reading every line, and illustrated his remarks by diagrams on the blackboard. He claims a saving of one-third or one-fourth the quantity of light by his reflectors; but he hopes to be able to give next year the results of some practical trials of the system, which has been patented. No remarks were made on the paper.

There was next a discussion on a question submitted by M. Sellier, as to the means to be employed to prevent the fouling of gas on its passage into the holders, and as to the causes of this fouling. Some interesting remarks were made upon it. M. Sellier stated that gas entering the holder at the Melun works clean leaves it dirty; and he said this result could not be attributed to the contamination of the vessel by imperfectly purified gas. It must, no doubt, be attributed to the water in the holder containing much sulphate, and even sulphide, of calcium. Carbonic oxide could displace the sulphur, and form sulphuric anhydride. M. Chevalet and also his son (M. F. Chevalet) both spoke on the question. They thought the sulphate of lime might be decomposed by organic matter and by some special microbes. M. Mallet bore testimony to the efficient purification of the gas at Melun before it was allowed to pass into the holder; and he thought the hypothesis submitted was quite admissible. M. Séguin remarked that he had seen a similar case to that described. M. Coze mentioned an instance in which contamination was due to gas passing direct through a distributor. M. Sellier replied that at Melun there was no bye-pass in the purifier-house; so that the case was not similar. Other members offered some remarks on the question. In thanking the speakers, the President pointed out that the problem still remained unsolved; and therefore it was to be hoped that the managers of any works in which a like trouble arose would carry out some chemical tests.

After this interlude, the reading of papers was resumed. The first taken was by M. Blanpain, on an improved arrangement of automatic gas lighter and extinguisher. M. Ménagé followed with a communication on another clockwork appliance; and M. Aubert dealt with the "Alex" system of lighting and extinguishing gas at a distance. The final paper was one prepared by M. Winckler, in which he compared electric and inverted incandescent gas lighting as used in a sewing-room, to the advantage of the latter. It was summarized for him, in his absence, by M. Bigeard. A paper by M. Largeron, on a new pressure-gauge registering loss of head, was not taken, as the author was not present.

This brought the technical business to an end and the Congress to a close.

Visits to Works.

On Tuesday afternoon, a large party proceeded by special train to Gennevilliers, where they had an opportunity of inspecting the works of the Société d'Éclairage, Chauffage, et Force Motrice. These works have been described in the "JOURNAL" from time to time—in the issues for Jan. 2 and 23, 1906; Jan. 8 and 29 and July 2, 1907; and Jan. 28, 1908, in which number a plan of them was given. As our readers may remember, the works were very seriously affected by the great floods which occurred early this year, as shown by the views, accompanied by descriptive particulars, which appeared in the number for the 1st of March (p. 571); and one could scarcely realize, when walking through them on Tuesday, that only a few months ago they were about 5 feet under water, as shown by a significant mark on one of the buildings. Since the description appeared, the works have been brought quite up to date, as will be found from the particulars which are to be given in an early number. It may be mentioned here, however, that on Jan. 1, 1906, when the Company commenced operations, they had to supply 68 of the suburban districts of Paris, with a population of 851,000 (60 of the districts having previously been served by the old Paris Gas Company); whereas on the 1st of January last they had concessions for 83 districts, with a population of 1,031,400. At the close of the inspection, the party were invited to partake of refreshment by the Chairman of the Company (M. Krantz), who, on behalf of his colleagues on the Board and himself, extended to the members a very cordial welcome, and drank to the success of the Society. The President (M. Godinet), in expressing the thanks of his colleagues for the good wishes enunciated, congratulated the Company on their very fine works. He alluded to the fact that only a short time ago the operations were affected for seventeen days by the dreadful floods with which Paris was visited; and therefore he said that he must congratulate the Company's Chief Engineer (M. René Masse), the Engineer-in-Charge (M. Raoul Frère), and the whole of the staff, on the efforts they had put forth to cope with the great difficulties which presented themselves during that very trying time.

The next afternoon a visit was paid to the works at Le Landy of the Société du Gaz de Paris, where the members had a good opportunity of seeing an interesting admixture of the old and the new in gas-works construction. Side by side with low gasholders working with outlet-pipes having bayonet joints are springing up others on quite modern lines; and in the immediate vicinity are the latest appliances for saving labour in the conveyance and storage of material and sending out gas at high pressure. Some weeks ago, an indication was given in the "JOURNAL" of the proposals formulated for rendering the gas-works of the City of Paris equal to the future demands upon them. Those of our readers who perused the articles referred to will probably remember that the station at Le Landy was several times mentioned. [We reserve till a future issue some technical particulars in regard to this station.] In their inspection of the works, the visitors had the assistance, as they did at Gennevilliers, of members of the staff; and in the pressure-house they listened to an interesting discourse by M. Laurain, the Chief Engineer of the Society, on the work of the plant it contains. Before leaving, M. Rouland, the Managing-Director, expressed the pleasure of the Société du Gaz de Paris to welcome members of the Société Technique. He remarked that they had had in the morning an explanation of the works by M. Laurain, and they now saw the extent of them. In addition to those inspected, new ones were to be constructed close by (the Cortillon works). He then introduced to the members

M. Garcenot, the chief carbonizing foreman at the works, who, he said, had been 35 years in the Company's service. He concluded by drinking prosperity to the gas industry, and expressed the hope that he should meet the members again two years hence. The President having voiced the thanks of the Société Technique to M. Rouland, the visitors returned to Paris.

The Banquet.

The subscription banquet of the Society took place at the Grand Hotel on Tuesday evening. M. Godinet presided; having on his right and left M. Marquisan, the President-Elect; M. Piaton, the President of the Syndicat Professionnel de l'Industre du Gaz; M. Rouland, the Managing-Director of the Société du Gaz de Paris; M. Ancel, the Chairman of the Lyons Gas Company; M. Krantz, the President of the Société d'Éclairage, Chauffage, et Force Motrice; and M. Tissier, representing the President of the Council. After dinner, the company having honoured the toast of "The President of the Republic," M. Godinet referred to the object of the congress and the work which had so far been done during the present gathering. He alluded to the wide interest taken in the congress, as was shown by the presence of representatives from Belgium and Italy. He concluded by drinking the health of all his colleagues. M. Rouland referred to the work of the Past-Presidents; and MM. Ancel and Krantz drank "Prosperity to the Société Technique du Gaz." M. Godinet and M. Marquisan having exchanged complimentary remarks on the transfer of the presidentship, M. Tissier, in a rather long speech, dealt with the relations of the Government to the industries, of gas companies to the consumers, and of employers to employed; and he referred to the system of profit-sharing as a means of ensuring peace instead of war between the latter classes. This speech brought the proceedings to a close.

EXCURSION TO BRUSSELS.

In accordance with the arrangements announced in the programme, the rest of the week was spent in Brussels, on the invitation of the President (M. Prisse) and the members of the Committee of the Belgian Association of Gas Managers. A party of eighty, including the President (M. Godinet), the President-Elect (M. Marquisan), M. Visinet (a Past-President), and the Permanent Secretary (M. Bouron), left Paris shortly after midday on Thursday for the Belgian capital, which they reached in the afternoon.

A Cordial Welcome.

In the evening the visitors received a cordial welcome at a gathering which took place in the tea-room of the Taverne Royale, at which were present Mr. Alexander Wilson (President), Mr. James W. Helps (the Past-President), Mr. S. Y. Shoubridge (Hon. Secretary), representing the Council of the Institution of Gas Engineers, who had received a similar invitation, and Mr. Philip Holmes Hunt, the President of the Victorian Gas Association. M. Prisse was accompanied by members of the Committee of the Association, including MM. Busine and Brender à Brandis (Vice-Presidents), M. Van Heede, Engineer of the Molenbeek-Koekelberg works of the Imperial Continental Gas Association (Secretary). He extended a cordial welcome to the members of the French and English Associations; and his remarks were followed by the playing of the "Marseillaise" and the English National Anthem. M. Godinet responded on behalf of his Society. The function was a very pleasant prelude to the subsequent hospitality.

Visits to Works.

Next morning, the entire party assembled early on the Place de Brouckère, where they found carriages waiting to convey them to the Forest works of the Imperial Continental Gas Association. The long procession of private vehicles was the cause of much astonishment to the suburban inhabitants. On arriving at the gas-works, the visitors were received by Mr. H. Salomons, the Engineer of the station, by whom, assisted by M. Delepaulle and other members of his staff, they were shown all that was of interest to be seen. The special features were probably the benches of vertical retorts, some of which were discharged in the presence of the company. This installation, some particulars in regard to which are given elsewhere, from a descriptive pamphlet prepared by Mr. Salomons, was thoroughly inspected; and then the party went through the other portions of the works. [These we hope to describe in an early issue.] Before leaving, the visitors were invited to partake of refreshment; and while doing so they received a cordial welcome by Mr. Salomons, who expressed his pleasure in receiving the members of the Société Technique and also of the Council of the Institution of Gas Engineers. They had, he said, witnessed the results of the conversion of old gas-works into new ones; and the transformation was still going on Next year, they would erect a holder of 100,000 cubic metres (about 3½ million cubic feet) capacity, which would be the largest in Belgium; and also convert an old coal-store into a vertical-retort house. Referring to the Société Technique, he remarked that it had extended over two generations, as there was present with them M. R. Ellissen, son of one of its founders. He drank to the prosperity of the gas industry. M. Godinet, in reply, thanked Mr. Salomons for his remarks, and he then proposed prosperity to the Association with which he was connected. Mr. Helps, speaking as the Past-President of the Institution of Gas Engineers (though he said this duty should have fallen upon Mr. Wilson, his successor), thanked Mr. Salomons for giving them an opportunity of looking over his works, in the improvement of which so much skill and energy had been displayed. He never visited the Continent without taking back something, as his works at Croydon showed. He therefore thanked the Belgian Association for their invitation to the English Institution, and assured them that the visit would leave many happy memories. The party then returned to the city.

In the afternoon, the carriages were again in readiness in the vicinity of the Northern Railway Terminus to convey the party to the works at Jette-St.-Pierre of the St. Josse-ten-Noode Gas Company. There they were received by M. Pavoux, the Chief Engineer, and M. Casaubon, the Assistant-Manager, by whom they were shown over the establishment. At the close of the inspection, M. Pavoux made a few remarks on the works (some particulars of which will be found elsewhere), and mentioned that they had been carried out in a short space of time. "Success to the French and Belgian Associations" was proposed and duly acknowledged; and the party left.

They were then driven to the gas-works of the Municipality at Schaerbeek, of which M. Aerts is the General Manager, M. Gennotte the Chief Engineer, and M. Bromham the Engineer. Pending a fuller description which will appear in a subsequent issue, it may be said that much interest was displayed in the spacious coal-store, with its electrically worked coal-trucks. Some of the inclined retorts here are on M. Gennotte's system—*i.e.*, larger at the discharging than at the charging end; and the generators are governed by M. Bromham's primary air regulator.

The Gas Lighting at the Exhibition.

Later in the evening, the visitors assembled at the principal entrance to the Exhibition (several ladies being of the party), where, under the guidance of the officials of the Belgian Association, they had a good opportunity of inspecting the systems of lighting in use. Of course, the chief interest centred in the gas lighting. The Auer Company, who have a tastefully decorated pavilion, exhibit some high-power illuminating gas under pressure on the "Pharos" system; while the Imperial Continental Gas Association light the greater part of the "Plaine des Attractions," where all the side-shows are to be found. The installation, which is one of the most important ever put up on the Continent, outside Germany, consists of about 18 high-power inverted "Colonia" lamps, supplied by the Actien Gesellschaft für Gas und Elektricitat, of Cologne, each supposed to be of 4500 to 5000 candle power; and they showed themselves certainly superior to ordinary arc lamps, and quite equal to "flame" arcs. The Brussels Municipality have in the city what they call "mixed" lighting—that is, gas and electricity; two branch lanterns being fitted with upright incandescent gas-burners, and the top lantern having electricity. The Imperial Continental Gas Association have put up, by way of contrast, a few lamps on the high and low pressure systems—two lanterns with three burners on the latter, and one upper lantern with two burners on the former. Other lamps have three inverted burners in small, and three upright burners in large, lanterns. One of the features of this excellent display is that the motive power for obtaining the high pressure is supplied by an exceedingly good small gas-engine, of 2 H.P., of German make; and it deserves to become more generally known (as it requires very little cooling water) in order to compete with electric motors. The compressing plant was described by M. Delepaulle, who is the Engineer for the outdoor work of the Association; and he also explained the construction of the high-power lamps which can be raised and lowered—the supply of gas being kept up during the ascent by an india-rubber tube, which is detached automatically when the lamp reaches the top. Not far from the compressor house are some lamps fitted with incandescent gas lights on the Greyson de Schodt "angle" system. As it was now getting late, the members of the party made their way back to the city.

A Day at the Exhibition.

On Saturday morning, the party again assembled at the principal entrance to the Exhibition, and proceeded to inspect the objects of more special interest to the gas industry. Passing through the British Section, attention was directed to the cases of chemical products shown by the Gaslight and Coke and South Metropolitan Gas Companies; the exhibit of the latter being a model, in pitch and sulphate of ammonia, of the Matterhorn. The stands of Messrs. Fletcher, Russell, and Co., Limited—one of heating and cooking stoves and the other of laboratory appliances—were visited. Other exhibits in the British Section were noticed in the "JOURNAL" for the 3rd ult. (p. 302). In the Machinery Section, there was seen a complete model of an installation of Bueb vertical retorts, transporter plant in action, a very fine show of both horizontal and vertical gas-engines, retort-charging machinery, and the Humphrey pump. In the Dutch Pavilion, Mr. George Wilson, of the Hague, Brussels, and Coventry, has an excellent show of gas-meters, both wet and dry—one, for 1000 burners, being in a glass case. There are also the "Excelsior" meter, and a new patent prepayment meter for two different pieces of money. Mr. Wilson also has on view a good collection of testing apparatus. In this pavilion there is a model of gas residual plant on the Rincker and Wolter system. Moving on towards the exhibit of the Belgian Gas Association, the party looked again at the compressor plant for the high-pressure lighting which had been explained on the previous evening. Close to this pavilion is that of M. Nestor Martin, containing a large and varied collection of gas-stoves. The house of Martin is well known all over the Continent; and

there is a very fine show of their goods. Next to M. Martin's pavilion comes the tastefully decorated one of the Auer Company, who show, in addition to lighting appliances on this system, including the "Pharos," the Clamond gas heating-stove. The pavilion of the Belgian Gas Association is packed with gas appliances of all kinds which space does not admit of separate notice. It may be mentioned, however, that the exhibit includes a baker's oven heated by gas, and also a large gas-heated pastry oven, with which practical demonstrations are given. The pavilion contains the latest types of heating and lighting appliances, including the incandescent burners set at an angle described by M. Greyson de Schodt at the congress of the Société Technique earlier in the week, and seen in operation in lamps erected in the grounds of the Exhibition. Close to the pavilions just mentioned is that of the Solvay Company, who show models of a coke-oven and coke quenching and loading plant, photographs of the plant at work, and glass jars containing samples of the products. The number of these ovens erected since their introduction in 1882, when only six were in use, is 3573. This part of the Exhibition must not be left without reference to the very fine pavilion of the City of Brussels, which one would never suppose was not a permanent building. It contains examples of the various branches of the communal services; but, of course, the gas supply was the one of special interest to the visitors, in view of their inspection of the gas-works the preceding day. There are on view numerous drawings of the different portions of the works and plant; one being of the telescopic gasholder of 1,306,000 cubic feet capacity. Another drawing shows the various kinds of public lamps in use in the city.

The next item on the programme was an exceedingly pleasant one. It was an invitation by the Belgian Gas Association to their French and English colleagues to luncheon in the restaurant in the Bruxelles-Kermesse. There was a numerous company. M. Prisse presided, having on his right and left respectively M. Godinet and Mr. Alex. Wilson. At the conclusion of the repast, M. Prisse, in the course of a brief speech, thanked the President of the Institution of Gas Engineers for accepting the invitation to visit Brussels, and also alluded to the presence of Mr. Holmes Hunt, the President of the Victorian Gas Association, who had come from Melbourne. He said that the gathering was evidence of the cordial feeling existing between the French, the Belgian, and the English Gas Associations; and he drank to their union. M. Godinet, responding for the Société Technique, said he knew the members would be well received in Brussels. It was very agreeable to him, at the close of his two years of office, to have such a welcome as he and his colleagues had had. He was much touched at this, and did not know how to thank the Association for all their kindness, and for the excellent conductors who had been provided for the visitors. He drank to the *entente cordiale* of the two Societies. Mr. Wilson asked to be permitted to express his pleasure at accepting the kind invitation offered by the Belgian Association to the Council of the Institution of Gas Engineers to join them and their French colleagues in Brussels. At first he thought he would not be able to do this; but the Fates had been kind to him, and had arranged matters so that he could join the gathering. His national poet, Burns, had sung of the time when—

> "Man to man, the world o'er,
> Shall brothers be."

So far as gas men were concerned, however, that happy time had apparently now arrived; for there were present gas engineers from Belgium, France, Germany, England, and even Australia, meeting as "brothers"—*confrères* all. On behalf of the Institution of Gas Engineers, he tendered the Belgian Association their best thanks for the invitation they had sent, which had enabled him and his colleagues who had accompanied him to inspect several of their gas-works, see the progress which had been made, and visit their fine exhibition; but, best of all, it had afforded them an opportunity of renewing old friendships, and of forming new ones with their brethren on the Continent. Mr. Holmes Hunt associated himself heartily with Mr. Wilson in his expressions of thanks. With a recognition of the great services rendered by Mr. Salomons and his assistant M. Delepaulle, and a toast by M. De Brouwer, jun., to the union of the gas engineers of all countries, this most pleasant function closed.

The party then proceeded to carry out the last item on the programme by visiting the French and Belgian Sections of the Exhibition. This may be left for subsequent notice; when opportunity may be taken to amplify the notes of the morning's visit.

The programme being completed, farewells were exchanged, and the happy and instructive visit was brought to a close.

Before concluding these necessarily brief notes of a week's important work, acknowledgment must be made by the writer of much assistance received, from printed matter and otherwise, in the preparation of them. To the new Permanent Secretary of the Société Technique (M. Bouron), to the officials of the gas-works visited, both in Paris and Brussels—especially to Mr. H. Salomons, the Engineer of the Brussels station of the Imperial Continental Gas Association—and to many others to whom it is unnecessary to refer personally, his sincere thanks are tendered.

TWO BRUSSELS GAS-WORKS.

As mentioned in the review of the proceedings at the recent congress of the Société Technique du Gaz en France, visits were paid to five gas-works. The following are particulars concerning two of those at Brussels; notices of the others being reserved for subsequent issues.

THE VERTICAL RETORTS AT THE FOREST WORKS OF THE IMPERIAL CONTINENTAL GAS ASSOCIATION.

The installation of vertical retorts at the above-named works was constructed in 1909, on ground previously occupied by the coal-stores connected with the original horizontal retorts. There are twelve furnaces in two groups of six. Each furnace contains ten retorts, 13 feet high, conical in shape, of rectangular section; measuring 23 in. by 9 in. at the top, and 28 in. by 14 in. at the bottom. The charging-stage is accessible from both ends, and also in the middle, by staircases, which at the same time give access to the steam inlet-pipes and the sight-holes placed on the front of the furnaces; also to the hydraulic mains and to the ends of the ascension-pipes. These incline towards the retort; thus allowing the heavy tar, which would rapidly blocks up the pipes, to flow towards the retort and deposit.

The discharging-floor is on the general level of the works. It is simple, owing to the employment of mechanism without complications situated at the height of a man on the front of the furnaces, and causing a minimum number of manipulations. The gas-producer is at the back of the furnaces. It occupies the whole height from the ground to the charging-stage, and will contain all the gas-producing material necessary for 24 hours. The grate-bars are horizontal. The cleaning-stage is on the general level of the works.

Besides giving access to the different places mentioned, one of the end staircases leads to the top of the coal-elevator, and on to the gangway all along the store; while the other leads to the coke and breeze bunkers, which are capable of containing sufficient for 24 hours, and also to the gangway which connects the two lifts that convey the coke and breeze into the settings.

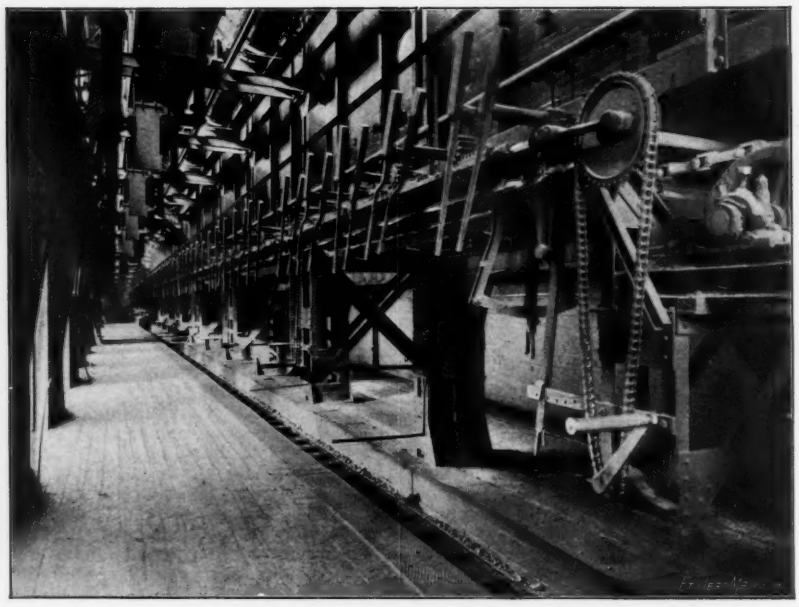
When the coal is unloaded, it falls into a distributor, which causes it to pass in equal quantities to a breaker. The distributor works like a jigger conveyor, only much more slowly. On coming out of the breaker, the coal falls on to a bucket elevator, which deposits it either on to the automatic weigher situated over the furnaces, or into an intermediate receiver, which distributes it on to the conveyor filling the large reservoir from which the furnaces are supplied. This conveyor is double—that is to say, there are

View of the Retort-House from the North-East.

two scoop chains inside each other, with a clutch arrangement to make them independent as regards movement. This enables the conveying of coal to keep going should one of the chains break. The two chains are driven by the same electric motor. The coal breaker and the elevator also have each an electric motor. If an accident should happen to render any part of the installation incapable of conveying the coal, it could be taken up to the top level of the storage hopper by means of a lift, in small ordinary overturning trucks, which can run on a gangway all along the hopper, and discharge their contents direct. Only one man is necessary to ensure even distribution of the coal.

The coke formed in the retorts falls into a conveyor, which is not immediately underneath them, but in front of the furnaces. This arrangement has several advantages, the chief of which is to allow the vapours and smoke caused by the extinction of the coke to rise much more quickly towards the roof, instead of inconveniencing the charger when the retort is open at both ends. Neither are the walls of the furnaces liable to become deteriorated in consequence of the action of these vapours.

The Charging Stage of the Vertical Retorts, Showing the Hydraulic Mains.

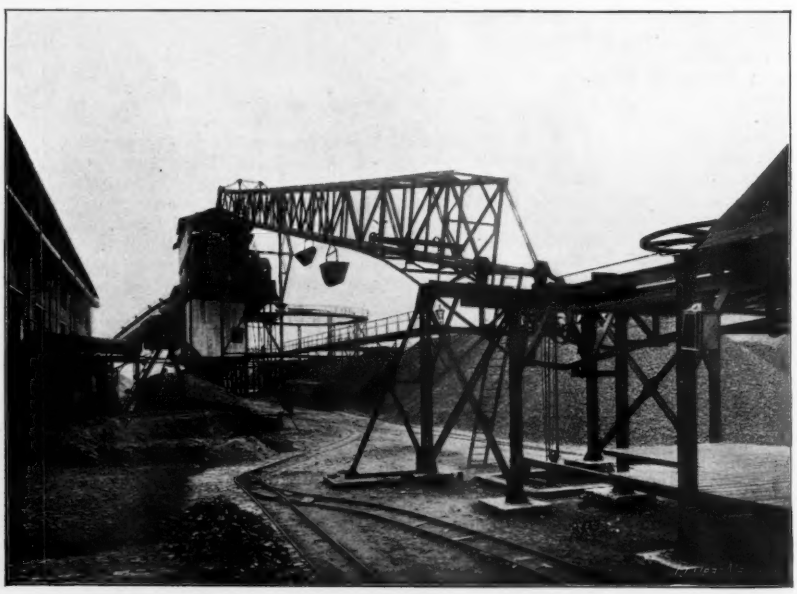


The Discharging Stage for the Vertical Retorts.

A De Brouwer conveyor runs along the fronts of the twelve furnaces; and the return is above. The driving power is electricity. The coke which is not used to feed the generators passes through a drawer at the end of the transporting-box, and is taken up by a cross transporter of the same system, which conveys the coke to a shoot for loading. Here are filled small trucks holding about 8 bushels each, which are afterwards run along an overhead railway, having an incline of 15°, to a storage reservoir annexed to the sorting plant. In regard to the coke used for feeding the generators, it is first cleared of its dust by being passed over perforated plates (forming a grating) which fill the bottom of the box at the end of the conveyor. It eventually reaches a loading shoot, where the small trucks are filled which are raised by a lift to a hopper placed next to the one receiving the breeze. This hopper has also underneath it flaps, which allow the coke to pass into charging bunkers for the generators. These bunkers, which contain about 27 bushels, run on a rail suspended from one end of the retort-house to the other. The filling of the generators takes place every twelve hours.

The entire installation is worked by six electric motors.

The other portions of the works will be noticed in a future number.



The Overhead Coke Transporter.

THE JETTE-ST.-PIERRE WORKS OF THE ST. JOSSE-TEN-NOODE GAS COMPANY.

The concessions granted to the St. Josse-ten-Noode Gas Company (a limited liability undertaking) embrace ten communes, the total population of which is 183,000. For the supply of these communes, nearly 850 million cubic feet of gas were sent out last year; the maximum day's output, on Dec. 25, being rather more than 3½ millions. The network of mains (the total length of which is 217 miles) is served from two works; one situated in the immediate vicinity of the Northern Railway Station, the other at the extremity of the communes of Laeken and Jette-St.-Pierre. The former works, which contain a central electricity supply station, date from 1845. The construction of the latter was not commenced till

March 1, 1906; and they were brought into use on the 20th of October the same year.

The Jette-St.-Pierre works, which occupy an area of nearly 20 acres, are connected to the Belgian State Railway, by which they receive direct their supplies of English, German, and French coal. The existing buildings, with the exception of the retort-house, were designed for a production of about 5½ million cubic feet of gas per day; but the works as a whole have been laid out for an ultimate output of rather more than 8¾ millions daily, inclusive of carburetted water gas. The installations actually in use are capable of turning out 1¾ million cubic feet per day. At present, there is only one bench of nine settings of eight 20-feet retorts at work, equal to the production of 152,000 cubic feet per day. The coal, brought direct by trucks or taken from the stack in Decauville waggons, is discharged by hand into two hoppers provided with oscillating distributors which feed the breakers. Two bucket elevators, each equal to lifting 30 tons per hour, raise the broken coal into the upper part of the building, where it is distributed by a horizontal conveyor into nine sheet-iron stores, each of about 640 cubic feet capacity. The retorts are charged and drawn by De Brouwer machines of the well-known type. On being discharged from the retorts, the coke can be shot into the furnaces or on to a De Brouwer conveyor, by which it is removed to the extremity of the bench, and, after being quenched, loaded into trucks with flap doors on to the heap in the yard.

The purifying plant at present in use consists of two water condensers, each having a cooling surface of rather more than 2000 square feet, one Pelouze and Audouin apparatus, and a "Standard" washer. The building containing this plant has been designed for three sets of appliances of the same power; and in it are two Beale exhausters of 1¼ million cubic feet capacity, and also the tar and liquor tanks, which have been constructed of armoured concrete. A separate building contains the apparatus for the chemical purification of the gas. On the ground floor are four purifiers with two hurdle grids in a group, each of about 1000 square feet superficial area, worked by a centre-valve, and having lids of sheet iron, four to each purifier, with dry joints. On the first storey is the revivifying floor, provided with 16 trap-doors corresponding to the number of purifier-covers. At about 10 feet above the floor, there are two travelling cranes connected by switches controlling two fixed side lines. When a box has to be emptied and the spent material spread out, a skip, mounted on a waggon worked by electricity, is first of all lowered into the box to be emptied. The skip is filled by hand, raised, drawn by the travelling cranes along the side lines, and emptied at any desired spot on to the floor. It then returns to its starting-point, and is lowered once more into the purifier.

There are on the works two "Duplex" station meters of 1½ million cubic feet per day. For the storage of gas, there are three holders —one of 706,000 cubic feet capacity; another, in course of erection, of 530,000 cubic feet; and the third, of 141,000 cubic feet, intended to hold the carburetted water gas before its admixture with the coal gas.

The outlet pipes from the Jette works are connected with the town mains by a 40-inch pipe, which passes in a tunnel of armoured cement under the line of railway running to Ghent. Moreover, a trunk main 14 inches in diameter connects the works in the Rue du Marché with those at Jette, and, by means of two Roots blowers, electrically worked, enables the gas produced at one works to be sent to the other, as required, at the rate of about 106,000 cubic feet per hour.

The Jette works possess carburetted water-gas plant, on the Humphreys and Glasgow system, capable of producing 600,000 cubic feet per 24 hours. The installation is about to be doubled. The air necessary for "blowing" the generator is furnished by two blowers electrically worked. The oil used for carburetting the gas is stored in underground tanks of armoured cement. The gas is stored in a holder capable of containing about 140,000 cubic feet; and before its admixture with the coal gas, the water gas is first passed through a Pelouze and Audouin apparatus and afterwards through a meter.

All the plant on the works is actuated electrically; and for this purpose a small central station has been provided. It consists of a steam-worked generating plant of 50 kilowatts capacity, and rotary transformer plant actuated by three-phase current at 11,000 volts supplied from an outside station, and brought down to 500 volts at the entrance to the works. The latter machine is to be duplicated.

The ammoniacal liquor is treated for the manufacture of sulphate of ammonia by plant, on the Chevalet system, of a capacity of about 7700 gallons per 24 hours. The salt, after being taken from the still, is air-dried; then stored in wooden bins.

The water for the supply of the works is obtained from a boring 12 inches in diameter and 525 feet deep. It is raised by a pump working by compressed air furnished by a special compressor in the machine-room. The water-tower, constructed of armoured cement, has on the ground level a room in which are assembled all the pumps used for the works; on the first floor, the tar and ammoniacal liquor reservoirs; and on the second floor, a water-tank capable of holding 22,000 gallons.

The works include the usual provision for the convenience and comfort of the workmen; and there is a laboratory, comprising an office, an operating-room, and rooms for carrying out photometric and calorimetric tests of the gas.

GERMAN ASSOCIATION OF GAS AND WATER ENGINEERS.

FIFTY-FIRST ANNUAL GENERAL MEETING AT KÖNIGSBERG, June 20 to 24.

[By Our Special Representative.]

A REVIEW OF THE PROCEEDINGS.

The Fifty-First Annual General Meeting of the Association was held last week at Königsberg, the flourishing capital of East Prussia, and the most easterly town of importance in the German Empire. It has now a population of upwards of a quarter-of-a-million, and carries on an immense shipping trade through its wharves on the River Pregel, which is navigable for large ocean-going steamers, and embouches within a few miles of Königsberg into the Frische Haff, which is one of the large salt-water lakes separated from the Baltic Sea by a narrow "Nehrung," or strip of low-lying sandy soil, at one end of which is a channel communicating with the sea. The adjacent sea-coast, on which several watering places have attained to considerable popularity, and excursions to some of which were made by those attending last week's meeting, is known abroad chiefly as the principal source of the world's supply of amber.

Königsberg presented many advantages as a *venue* for the annual meeting of the German Association. The gas-works of its Corporation has become well known of late years on account of the many novelties in methods of working and in plant which have been introduced there. The first Dellwik water-gas apparatus on a gas-works was erected at Königsberg, and some interesting experiments were made with it, as reports by Professor Vivian B. Lewes and other authorities in earlier volumes of the "Journal" have disclosed. At one time, a proportion of town refuse was converted into gas on the works, and it is not many years since that at a meeting of the German Association, Herr Kobbert, the Manager of the Königsberg gas undertaking, startled his hearers by expressing the opinion that gas of far lower illuminating power and calorific value than was then ordinarily made, or generally advocated even by advanced gas engineers, would fulfil modern requirements. He stated that he was then adopting the supply of very low-grade gas at Königsberg, and that the results were justifying the move. To-day he enjoys the distinction of having popularized the sale of gas to an extent which few of his German colleagues can claim to equal, by the widespread employment of prepayment meters, in connection with which (as was reported recently in the "Journal") he has introduced somewhat novel methods of collecting the coins and checking the receipts. Also, he has erected on the gas-works a large installation of carbonizing chambers or ovens, of which a description appeared in the "Journal" a few weeks ago, and of which more will be said anon. To sum up, he is a Gas Manager ever ready to adopt new ideas provided they show good promise of furnishing results in any way better than those hitherto obtained; and, further, he is himself well capable of originating ideas of value in connection with gas supply and of bringing them to fruition.

On the other hand, there were many disadvantages attendant on the choice of Königsberg as the place for the meeting. It lies in an extreme corner of Germany, and to reach it means from most parts a long and costly journey, which many members of the Association could not be expected to undertake. Even from Berlin it is 366 miles distant; and the route to it from nearly all the large towns of Germany lies through Berlin. From the south of the Empire it is a very far cry—for instance, it is about 770 miles by rail from Munich. Hence it is not surprising that the attendance at this year's meeting of the Association fell far short of that which we have come to regard as normal for these annual gatherings. Instead of ten to twelve hundred persons, there were this year only five hundred odd present. In many respects, the smaller attendance was advantageous. There was less inconvenience than sometimes occurs through overcrowding at the technical meetings and social functions; while those who came to the former were bent for the most part on closer attention to the proceedings than is often the case.

Many prominent German gas men were, however, absent. Among those who are well known in England may be mentioned as absentees: Herr W. von Oechelhaeuser, the Managing-Director of the German Continental Gas Company, and Professor H. Bunte, of Carlsruhe, who unfortunately was unable to be present through ill-health. Of prominent water engineers whose presence was missed, Mr. W. H. Lindley, of Frankfort, may be mentioned, since he is one of the most active members, and at the time a Vice-President of the Association. The usual considerable complement

of Swiss gas engineers dwindled to one or two, owing to distance; but the northern countries of Europe were naturally more numerously represented. The President of the Association, Herr Prenger, the Manager of the Gas, Water, and Electricity undertakings of the Corporation of Cologne, presided at the sittings in a highly commendable businesslike manner, with the result that the lengthy programme was carried through with a promptitude and dispatch which are sometimes far to seek at the meetings of the Association. Fine weather prevailed except on the Friday, when the whole-day excursion to the Baltic bathing resorts was marred by rain, and consequently was poorly attended.

The meetings were held in the Thiergarten, which lies outside the city wall, but is easy of access by the Corporation tramway system, on which members were carried throughout the week without charge. The technical proceedings took place in the Concert Hall of the Thiergarten—a more commodious and convenient, if less ornate, room than is generally obtained for the annual meetings. The inaugural reception and the banquet were held in the adjacent Banqueting Hall—an enormous barn-like structure, which, however, served for the purpose excellently. Königsberg is not rich in fine, modern buildings and halls; but from the purely practical or utilitarian standpoint, the members could not have had better accommodation for the meetings. Another feature of the gathering in respect of which it contrasts very favourably with those of several recent years, was the excellent organization of, and promptitude of service at, all the functions, for which, and the absence of any formality, the practical northern character of the members of the local organizing committee may perhaps fairly be said to have been responsible. The technical programme, as will appear later, was also good, though two papers which had been announced for reading were as a fact not presented.

Minor Gas Meetings.

Advantage was taken of the assembly in Königsberg of so many German gas engineers to hold two minor gatherings in which a number of them participated. There was a meeting on Saturday, the 18th inst., under the chairmanship of Dr. Leybold, of Hamburg, of the Committee who control the collection of, and administer, the special workmen's accident compensation fund, to which all German gas undertakings are compelled by law to contribute. The sums disbursed annually through the medium of this fund are very large, especially when there has been during the year an accident involving many fatalities and serious injuries, such as that of the burning out of the large gasholders at the Grasbrook Gas-Works at Hamburg last December. [In regard to these gasholders, we learn that the re-erection of the old or smaller one is already far advanced, and that it will come into operation in the late autumn of this year; but so far the reconstruction of the large new gasholder with its annular elevated tank stands in abeyance.] On Monday, the 20th inst., the Baltic District Association of Gas and Water Engineers took the opportunity to hold its thirty-eighth annual meeting at Königsberg—this being the first time that it has met there since its inception. About eighty members assembled shortly after eleven o'clock in the Artushof, which is the quarters of the local Association of Commerce, under the chairmanship of Herr Gellendien, the Manager of the Gas and Water Works at Elbing. The Mayor of Königsberg was represented by Town-Councillor Bieske, who tendered, on behalf of the Corporation, welcome to the members. He went on to say that the town of Königsberg had been in possession of its gas and water undertakings for over fifty years, and in the course of this time had had many "hard nuts to crack" in regard to them. Such an Association as that of which they were members was valuable in assisting in the solution of difficult technical problems, and in advancing the application of scientific methods to industrial concerns. He hoped that those present would assist to dispel the impression which prevailed in parts of Germany that Königsberg was imbued with the Russian rather than the German spirit and ideals. The Chairman, after thanking Herr Bieske for his words of welcome, presented the report for the year 1909-10, which showed that the membership of the Association had increased to 163. Two of the gas-works which had been affiliated to the Association since its formation—viz., Elbing and Thorn—were now celebrating the jubilee of their existence. The past year had witnessed many technical advances in the gas industry; but a step had been taken in another direction which the Council regarded as of the greatest importance for the further development of gas supply. This was the establishment of a Central Organization for Promulgating the Sale of Gas, which had been started with funds contributed mainly by some of the larger German gas companies and a number of manufacturers of gas plant and apparatus.

After the report had been adopted, the Chairman proposed, and it was unanimously agreed after a lively discussion, that the Baltic District Association should support the new Central Organization by contributing £10 per annum to its fund for the next three years, with an additional donation this year of £15. In the course of the discussion, Herr Lempelius, the Manager of the organization, explained its objects, of which more will be said later in connection with the proceedings at the meeting of the parent Association. A debate then took place on the *brochure* relating to the sale and use of gas, and in particular on the section of it giving rules to be observed by gas-fitters, compiled by the Heating Committee of the German Association of Gas and Water Engineers. This *brochure* will be referred to in connection with the report of the Committee—it will suffice now to say that the Baltic District Association expressed approval of its contents. Herr Gellendien, of Elbing, was re-elected President of the Association, and it was decided to hold next year's meeting at Hohensalza. After other private business had been disposed of, a discussion took place on prepayment gas-meters, in the course of which Herr Merkens, the Manager of the Insterburg Gas-Works, said that their introduction in the town had been attended with a most satisfactory increase of business. The unsatisfactory behaviour of water-meters was the theme for further debate; and the proceedings closed early in the afternoon with a vote of thanks to the Chairman.

The Inaugural Reception.

About 500 members and guests of the German Association of Gas and Water Engineers assembled in the Banqueting Hall of the Thiergarten on Monday evening, the 20th inst., for the customary inaugural reception and supper. The hall, in which (appropriately enough) electric arc lamps have recently been displaced by the high-power inverted "Degea" gas-lamps of the German Welsbach Company, was decorated for the occasion. The Burgomaster of Königsberg (Herr Kunckel) represented the Corporation, and welcomed the visitors.

Technical Proceedings—First Day.

The technical proceedings commenced shortly after 9 o'clock on Tuesday morning, in the Concert Hall of the Thiergarten, under the chairmanship of the President of the Association, Herr Prenger, the Manager of the Gas, Water, and Electricity Works of Cologne. He was supported by Herr Kordt, the Manager of the Düsseldorf gas undertaking, and Dr. K. Bunte, of Carlsruhe, who has succeeded his father Professor H. Bunte, as General Secretary of the Association. Other members of the Council of the Association were not present. The government of the province was represented by Privy-Councillor Twiehaus, in the absence on holiday of the Governor Count von Keyserlingk. He said that the Government took a keen interest in the proceedings of the Association, having regard to the importance to the nation of proper supplies of gas and water in towns. He was glad to see that the vexed question of the use of the divining-rod was to be discussed. In the absence of the Lord Mayor, Herr Körte, Burgomaister Kunckel expressed the gratification which was felt in Königsberg at the visit of the Association. He referred to the importance of gas and water works to a community, and to their revenue-earning value. It was very necessary that the manager of a municipal gas undertaking should be not only a gas engineer, but also a commercial man. In Königsberg, the population had scarcely doubled the last 21 years; but the quantity of gas sold had increased six-fold, which indicated a remarkable commercial expansion. He hoped that those present would find time to see Königsberg thoroughly, and would form a favourable opinion of it. He wished that their deliberations might be fraught with beneficial results. Professor Strache, of Vienna, next expressed the good wishes of his colleagues in the Austro-Hungarian Association of Gas and Water Engineers, and their hopes that success might attend the meeting. The President, in acknowledging all the good wishes expressed by the previous speakers, pointed out that, while the gas and water engineers would ever be loyal to the State and their respective Municipalities, they would point out that gas was now subject to keen competition from electricity, and that it could not stand repeated attacks on it by way of State taxation and calls for profits for the relief of rates. He desired to acknowledge, however, in particular the indebtedness of the Association to the Corporation of Königsberg for two elaborate *brochures* presented to everyone attending the meeting—one dealing fully with the water supply of the city, and the other with the gas supply. [An account of the gas undertaking, compiled from the latter *brochure*, is commenced on another page—955—of to-day's "JOURNAL."] It had long been the desire of the Association to make the acquaintance of the Baltic cities of Germany, but hitherto they had been unable to carry their wishes into effect. Passing on to the record of the Association for the past year (which will be more fully dealt with in a summary of the annual report of the Council next week), he referred with special regret to the loss which the members had sustained through the death of their colleague Herr Kunath, late Manager of the Gas and Water Works of Dantzig. This reference was recognized in the customary manner by all those present rising from their seats. In regard to the absence of Professor H. Bunte, of Carlsruhe, through illness, a telegram from him wishing success to the meeting was read out by the President, who said that a telegraphic acknowledgment expressing hope of his speedy recovery would be sent. Continuing, he emphasized the benefits accruing to the gas industry through the stimulus of competition, to which he ascribed its indebtedness for many of the recent technical advances. Gas managers could no longer sit down quietly and look for the receipts to pour in. They had to strive strenuously to secure them. It was now necessary that they should have free scope to work their undertakings as commercial enterprises, without the incubus which the demand for heavy and constant contributions to the municipal chest laid upon them. He referred to the new Organization for Promulgating the Sale of Gas, initiated in Berlin on March 14 last, and commended it earnestly to the support of all interested in the future of the gas industry. Relatively peaceful and uneventful was the life of the water engineer. He had quietly to set about pumping more water. He had not to advertise his wares in order to increase his sales.

Retorts and Gas-Meters.

The President then called upon Herr Kobbert, the Manager of the Königsberg gas undertaking, to read a paper on "Retorts and Gas-Meters." Unfortunately, the author failed to make himself heard throughout the room (and the paper was not circulated in print); but the following are the chief points he made: The phases of gas supply might be considered as, firstly, the manual working of retorts and processes; secondly, the development to mechanical operation and improved retort-settings and modes of carbonization; and, thirdly, the chemical utilization of the bye-products of gas manufacture. Discussing these points, he came to the conclusions that: (1) The interest and depreciation charges which it was necessary to allow and the cost of repairs might quite easily eat up any advantage which might accrue in other directions from the adoption of costly plant. The final and most important point in determining the choice of retort-settings or other plant was the capital outlay that was involved, and frequently, assuming the same productive capacity, this had nothing to do with the technical advantages of the plant. (2) A proper estimation and comparison of the capital charges for different plants and types of setting only became possible when an actual plain working-scale investigation had been carried out. (3) A comparison of the economical achievements or industrial results attained by different gas-works could only be fairly made on the basis of the net profit realized, taking into consideration the average price at which gas was sold, and allowing a proper mode of reckoning for the cost of public lighting. It was best made by drawing up a balance-sheet, which should be applicable to both municipal and commercial book-keeping. (4) The object of gas-works should be to agree to a plain scheme for calculating prime cost, which should be independent of the particular method adopted on its own account by each undertaking. A common basis would thus be afforded for the exchange of opinion which was of so much importance in regard to the economical results attained by a works.

In regard to gas-meters, the author expressed the view that, notwithstanding the high degree of perfection and the great convenience of dry meters, the measurement of gas by means of wet meters must be considered less open to objection. But in that case a liquid of constant volume, and not liable to corrode metal, must be found and employed.

The next paper, which was discussed together with that by Herr Kobbert, was one written by Herr F. Kordt, the Manager of the Düsseldorf gas undertaking. It dealt with "Depreciation Charges, Capital Redemption, and Renewal and Extension Funds of Corporation Gas-Works." An abstract of this paper is in preparation for the "JOURNAL." But it may here be said that the author has arrived at the conclusions that with small works, with relatively little receipts and outgoings, it is better to reckon depreciation charges on the basis of prime costs, as uniform sums for depreciation which shall not be too high at the commencement must be applied. For large works, on the other hand, where the receipts and outgoings throughout the year are heavy, and there are numerous new buildings and extensions, the author thinks that it is better to take depreciation on the book-value of the plant, as is done in the case of almost all large industrial concerns. The depreciation charges must, in any case, be fixed on a proper accountant's method, and not in deference to the requirements for the time being of the municipal exchequer.

Promotion of the Sales of Gas.

The next item in the proceedings was the giving by Herr Lempelius, of Berlin, of an account of the new "Central Organization for Promulgating the Sale of Gas," to take up the management of which organization he resigned the position of Engineer of the Barmen Gas Works. He said the first question was, What is the present real position of the gas business? Electricians would reply that it was retrogressing; and this opinion was not uncommonly held by many persons of all ranks who had no special knowledge of the matter. Some believed that the use of gas would in the future become restricted to its application as a source of heat for industrial purposes, to household heating, and to cooking. In order to learn the real position at the present time, and the prospects for the future of gas supply, the author had set himself to study whether the apparatus available for the use of gas for different purposes was as technically perfect as possible, as its perfection must be a condition precedent to progress and to extension in the employment of gas.

He had sought to ascertain whether the technical advances in the methods of using gas were such as to cause it to appeal to wider circles of users, and to extend its use in new directions. An article in a recent number of the "Electrotechnische Zeitschrift," was of interest in this connection. It referred to the displacement of electricity by high-pressure gas for street lighting in the City of Westminster, which raised a signal of alarm for electricity in its competition with gas. This use of gas might have reached England, like so much else, from Germany. For years past, high-pressure street lighting had been more and more used in place of electricity in Berlin, as it was proved by the results to be preferable. It afforded a more brilliant and better illumination; but, unfortunately, the gas-lights were commonly supposed by the general public to be electric, and consequently gas did not get the credit for its achievements. High-pressure gas also was finding many new applications for industrial purposes; and these constituted a great advance and an extension of the use of gas in a new direction, in which many brilliant opportunities for it presented themselves. The use of high-pressure gas for lighting, also, though adopted on an extensive scale in Berlin, had still to extend to other towns, and must be regarded as yet in its infancy. It could not be contended, either, that the maximum economy in the development of light from gas had been attained. Further advance was assured; and, speaking generally, it might be said that there had been no previous period in the history of gas supply characterized by such continuous improvement in gas-lamps as was the present.

The advantages of gas for the supply of heat also were unparalleled; and it only rested with gas engineers to see that advantage was taken fully of the wide field that lay open, in Germany in particular, for development in the use of gas for heating purposes. Connections and mains should be extended, and supply-pipes put in free of charge, and meters and heating and cooking apparatus installed on the prepayment or hire system. By this means, gas would be brought within reach of people of small means, who would not be slow to avail themselves of its advantages for lighting, heating, and cooking.

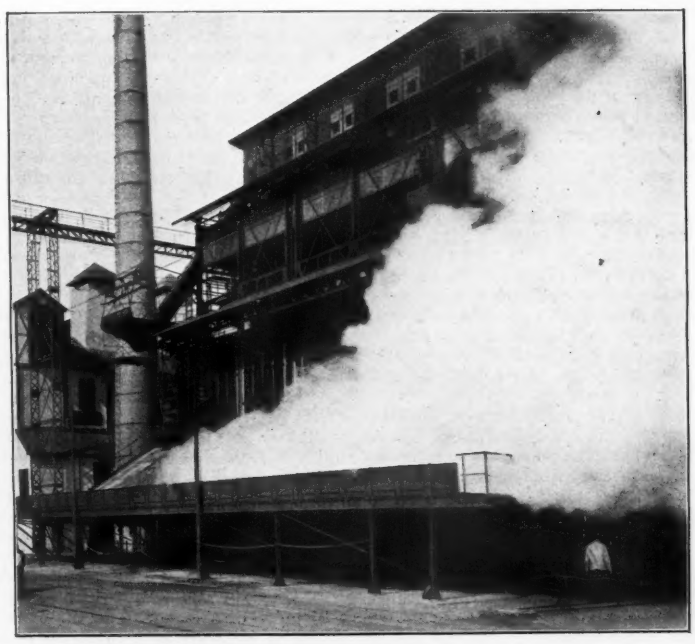
The answer to the general question which he (Herr Lempelius) had propounded at the outset, as to whether we were now in a period of expansion in the gas industry, was an unqualified affirmative. He had endeavoured to review the whole field of the use of gas, and its general prospects, with the object of showing that there was ample scope for development; and it was the purpose of the newly-founded organization (to the managership of which he had been appointed) to further this development by making known to the Press, to the public authorities, and to the general public the great advantages to be gained by the employment of gas to a greater extent than hitherto and in new directions. He asked all those present at the meeting to give the new Central Organization their moral and their financial support. The efforts would result in general benefit to the gas industry.

The Application of Gas for Industrial Purposes.

The next paper, by Dr. E. Schilling, of Munich, on the "Application of Gas for Industrial Purposes," overlapped in some points the ground covered by Herr Lempelius. But it dealt in greater detail with the newer industrial uses of gas, and contained a carefully made and apparently (for the time being at least) exhaustive compilation of the different types of gas apparatus, the uses to which they were being put, and the German firms by whom they were supplied. A summary of the contents of this useful contribution to the proceedings will be given in the "JOURNAL" next week. A short discussion concluded the technical proceedings for the day.

Visit to the Königsberg Gas-Works.

In the afternoon, the new gas-works of the Corporation were thrown open to inspection, and were visited by most of those attending the meeting, though two alternative visits to other works had been arranged for the same afternoon. A description of the



Quenching the Coke after Discharge from One of the Chambers of the Königsberg Installation. From a Photograph by A. Kühlewindt, of Königsberg.

The Installation of Inclined Carbonizing Chambers at the Königsberg Gas-Works on the occasion of the Visit of the Members of the German Association on Tuesday last.

(Photograph by A. Kühlewindt, of Königsberg.)

gas-works is commenced in other columns of to-day's "JOURNAL;" and it will suffice to say here that the interest of those who visited the works centred chiefly in the installation of six beds, each containing four large inclined carbonizing chambers or ovens. The discharge and quenching of the coke from these chambers was witnessed by the party; but in one case at least the discharge proved to be anything but automatic, and some ten minutes were expended in getting the greater part of the block of coke out of the oven. When the discharge of the coke takes place automatically in the proper manner, nothing more perfect, from the technical standpoint, could well be desired. But, apparently, the coke is very apt to hang-up in most of the existing types of large inclined chamber settings; and it is then very difficult to handle, owing to its immense mass and the great amount of heat radiated from the open oven. The quenching of the coke in the open trough at the foot of the inclined plane in front of the discharging side of the settings presents many advantages; and the enormous cloud of steam raised by the operation passes away quickly without appreciably incommoding the men employed in the quenching, which is done by hose manipulated from the top of the inclined plane. The annexed illustrations are reproduced from two photographs of the discharge and quenching of the coke in the presence of the members of the German Association on their visit to the works on Tuesday last.

Another group of members visited on the same afternoon the Corporation water-works at Hardershof. A very exhaustive account of the water undertaking of Königsberg had been prepared by Herr E. Kuck, the Manager of the water-works, in collaboration with Herr B. Denk, the Corporation Building Surveyor. It was printed in the form of a *brochure*, replete with many plates and maps—a copy of the *brochure* being presented to every one who attended the meeting. Yet another group of the members visited the large gas-meter works of the firm of Liessmann and Ebeling.

In the evening, there was a garden festival in the pretty adjacent gardens of various lodges and clubs on the bank of the lake known as the Schlossteich, which is one of the most charming and characteristic features of Königsberg. Outdoor glee singing and illumination of the grounds conduced to the general entertainment of the members.

Technical Proceedings—Second Day.

The second day—Wednesday—was, as usual, devoted almost entirely to matters connected with water supply. The first paper, by Herr Bieske, of Königsberg, discussed the *pros* and *cons* of the utility of "The Divining-Rod," in which, to judge by the discussion which followed, there are still a number of believers in Germany, even among technical men. The author said that when the water-diviner failed to find water on a particular day, he ascribed the fault to the rod he happened to be using at the time. Apparently the virtue of the rod was somewhat intermittent in its manifestation. Recently, diviners had sprung up who professed to find petroleum by means of a bronze wire "rod," and others who used a copper rod to detect the presence underground of coal seams. It was an unfortunate fact, the author said, that the State authorities in Germany certainly appeared to recognize the claim of the water-diviner to professional status, and acted accordingly, though they had been led into many mistakes as a consequence. A letter written by Herr Dernburg, the late Chief Secretary of the Colonial Office of Germany, to an engineer with reference to available water supplies in the African colonies, showed that while he was not prepared to express any definite opinion as to the merits of water divination, he was disposed on the ground of its lower cost to prefer it to a scientific investigation for water. The author protested strongly against the putting of water divining on terms of equality with scientific work. In conclusion, he expressed the opinion that the Government should appoint a competent authority—such as the Geological Survey Department—to collect statistics as to all known cases of water-divining; recording both successes and failures, and in the former distinguishing between the instances where there were previous indications of water and those in which there were none at all. As already stated, several speakers in the lively debate which ensued on this paper took a more favourable view of the pretensions of the water-diviner than did the author. The President, in conclusion, said that scientific inquiry would undoubtedly put light on the whole question of water-divination.

The next paper was one by Herr Denk, of Königsberg, describing experiments which had been made on "The Clarification of the Königsberg Drinking Water with Sulphate of Alumina." Certain of the available sources of water supply to the town lacked clearness, owing to the settling-out of peaty matter containing iron, and were not clarified by slow sand filtration. Experiments had been made, on a small scale, of the use of sulphate of alumina for clarifying this water; and the results had been so far successful that a large plant for the purpose was about to be installed. The objections to the use of the unclarified water were rather a question of its taste and its appearance than of hygiene; but it was hoped that the use of sulphate of alumina would remove in a satisfactory manner all the objections to the use of the water from the peaty sources.

A paper was next read by Dr. Tornquist, of the Professorial Staff of Königsberg University, and Director of its Geological Institute, on the "Subsoil of East Prussia, and its Bearing on the Water Supply of the Province." This paper, naturally, was primarily of local interest, and need not here be mentioned any further.

The report of the Committee appointed by the Association on the question of the Working of Water-Works was next presented

by the Chairman Herr Reese, of Dortmund. A brief abstract of this report will be given in the "JOURNAL," along with abstracts of the reports of the other Technical Committees of the Association. That of the Committee on Electrolysis or Vagrant Electric Current, signed by Mr. W. H. Lindley, of Frankfort, as Chairman, was next taken, and was followed by the report of the Educational or Instructional Committee, of which Herr W. von Oechelhaeuser, the Managing-Director of the German Continental Gas Company, of Dessau, is the Chairman. The day's technical proceedings concluded with the presentation of the report of the Committee on Gas-Meters, by Herr Kohn, of Frankfort-on-the-Main, its Chairman.

Excursion to a Baltic Bathing-Resort.

In the afternoon, the members left Königsberg by special train for Cranz, a popular bathing-resort about 40 minutes distant by rail on the Baltic coast. The weather was good, and the promenade was found very pleasant. After supper in the restaurant of the Grand Kurhalle, a dance occupied the time until the return special train to Königsberg had to be joined.

Technical Proceedings—Third Day.

The third sitting opened on Thursday with private business; and then Dr. Hurdelbrink, of Königsberg, read a paper describing a "Process for the Joint Extraction by Washing of Ammonia and Sulphuretted Hydrogen from Coal Gas." An abstract translation of this paper is given on another page of to-day's issue. In the discussion which followed, an opinion was expressed that the difficulties attendant on the working of the process would be such as to preclude its practical adoption. The next paper was by Dr. Wolffram, of Hamburg, on "Development in Gas Purification." An abstract translation of this paper also appears in another column of this number. Then followed an interesting paper by Dr. Max Mayer, of Berlin, on "Valuing the Quality of Illuminating Gas according to its Calorific Power." Particulars of the contents of this paper will be found on another page.

Dr. K. Bunte next presented the report of the Committee on the Instructional and Experimental Works of the Association at Carlsruhe. In view of the large amount of work of general interest recorded in this report, a special abstract of it is given to-day, together with a synopsis of the results of tests on English gas coals referred to in the report. Supplementary to the report of this Committee, was a paper by Dr. K. Bunte, giving "Information about Gas Coals," as gathered from the experimental work on gas coals carried out at the Carlsruhe Institution. A nearly full translation of this paper follows our abstract of the report of the Committee. The report of the Committee of the Association on Photometry was not ready for printing with the reports of the other Technical Committees; but Dr. Leybold, of Hamburg, the Chairman, stated that the Committee had been mainly engaged in testing the efficiency of safety lamps for use on gas-works. Eighteen types had been tested; but though many of these were perfectly satisfactory for the mixtures of air and fire-damp which occur in coal-mines, they were not reliable for mixtures of air and coal gas such as might occur on gas-works. Details of the investigations and the conclusions therefrom would be given in the report which was about to be printed. The report of the Committee on "Heating" was presented by its Chairman, Dr. E. Schilling, of Munich. It dealt mainly with the establishment of a general code of regulations for the sale of gas, and for the carrying out of house installations by gas-fitters. These regulations had been under the consideration of the various District Gas Associations for a twelvemonth, and a number of modifications had been made in them, on the suggestion of one or other of the District Associations. The regulations are set out at great length and with much fulness of detail. Any further reference to them must be postponed until next week; but it may be said that they are framed, after the German fashion, with a view to providing for all probable (and many improbable) contingencies, and that they would be antagonistic to the procedure followed in connection with gas supplies in this country. They were approved by the meeting.

On the recommendation of this Committee, it was decided that, if adequate accommodation could be secured, the Association should participate in the Exhibition on Hygiene which is to be held in Dresden next year. A Special Committee was appointed to make the necessary arrangements.

It was also decided to appoint a new Technical Committee to investigate and report on "The Working of Gas-Works." The members selected by the meeting were: Herr Kordt, the Manager of the Düsseldorf Gas-Works, Herr Kobbert, the Manager of the Königsberg Gas-Works, Herr Lempelius, the Manager of the new organization for promoting the sale of gas, Dr. E. Schilling, of Munich, and the President, Herr Prenger, of Cologne.

The report and accounts of the Association for the past year were next taken and passed. A brief abstract of the report will be given next week. The members of the Technical Committees for the ensuing year as well as the officers were next elected. Herr Prenger, of Cologne, was re-elected President of the Association. It was decided to hold next year's meeting at Dresden. With a few speeches of compliments and thanks, the sitting was brought to a close.

Concluding Functions.

For the afternoon of this day (Thursday last), alternative visits to three works had been arranged—viz.: (1), The Corporation water-works at Hardershof; (2), the Corporation sewage-works; and (3), a waggon-works, and the grain silos which are a characteristic feature of Königsberg. In the evening, the customary banquet took place in the Banqueting Hall of the Thiergarten, when the usual complimentary speeches were made. It was followed by a display of fireworks, and an adjournment then took place to the Concert Hall for dancing, which continued up to a late hour.

The concluding function of the meeting was a whole-day excursion on Friday to Warnicken and Rauschen, and the intervening stretch of coast on the Baltic Sea. Unfortunately, its success was somewhat marred by rain falling heavily at intervals. Thus concluded a meeting which, if not conspicuous in the annals of the Association for a large attendance or exceptionally brilliant festivities, carried through a good technical programme in a satisfactory and businesslike manner.

EXTRACTING CARBOLIC ACID FROM TAR-OILS.

By WM. MASON.

As it is just now the quiet time in tar distilleries, it may be advantageous to some to consider the methods of extracting carbolic acid.

Years ago, it was the practice to treat the oils with caustic soda solution; separate this from the denuded oil; and throw up the carbolic acid with sulphuric acid. This results in the loss of all the soda and the whole of the sulphuric acid. But, since at the present time carbolic acid is only worth about 1s. per gallon, such a method is out of the question, as by it the materials to recover a gallon of carbolic acid would cost about 7d. The same, too, may be said of the method by which carbolic acid is obtained by means of sulphate of soda and lime.

The cheapest and best method is to treat the light oil with caustic soda solution of about 22° Twaddel, whereby a carbolate of soda is produced which may be separated from the light oil from which it has been extracted, by subsidence in the usual way. This carbolate of soda is then treated with a current of carbonic acid gas, which forms carbonate of soda, and sets the carbolic acid free. The separated carbolic acid floats on the surface of the strong carbonate of soda solution, which is drawn off from below the carbolic acid, and (being causticized with lime) is employed over again continually.

The point, however, to be considered by this method is the production and purification of the carbonic acid gas. This gas may be produced in a coke-furnace; but much care would have to be exercised in its construction and working, since to obtain gases containing much carbonic acid would result in a higher temperature being obtained than the materials of the furnace would withstand. With escaping gases containing only 6 per cent. of carbonic acid, the initial temperature would be about 900° C. These gases, too, would have to be purified and cooled.

Now, since tar and ammoniacal liquor are generally distilled in the same works, carbonic acid gas may be obtained from the waste gases issuing from the sulphate of ammonia saturators. The gas from this source has been used for this purpose very successfully in the works of Messrs. Hardman and Holden, of Manchester. The method of working was as follows: The gases as they issued from the saturators were first passed through a surface cooling-coil; then through two larger scrubbers (old boiler shells, about 30 ft. by 7 ft.); and, lastly, through an oxide of iron purifier. The gas issuing from the purifier was almost entirely carbonic acid—often containing 96 per cent. With such a strong gas, it will readily be understood that a rather simpler plant may be used than when the gas is made in a coke-furnace, as before mentioned. For instance, a much smaller air-compressor and a coke-tower of simple construction may be used for carbonating the carbolate of soda.

There is, however, one great drawback to this method; and that is the condensed water from the cooler and scrubbers contains hydrogen sulphide in solution, which has to be dealt with before it leaves the works. In Messrs. Hardman's works it was allowed to run away into a sandy soil, and was thus got rid of. But a much better method would be to dehydrate the gases as they come from the ammonia still, as is done in the ammonia-soda process, by placing a surface cooling-coil between the still and the saturator at such an altitude that the condensed liquor could be syphoned back into the still. Or the coil may be placed on the ground; and the condensed liquor, collected in a closed vessel, may be pumped back into the still. In this way, the gases issuing from the saturators would consist only of carbonic acid and hydrogen sulphide, and would therefore not require the large scrubbers and condensers before mentioned. Besides, nearly the whole of the sulphur might be recovered in the purifier. Further, in works where carbonic acid is already being used, only inexpensive additions would be required; but the operations might be much quickened by using nearly pure carbonic acid.

Presentation to Mr. Harley A. Stephenson.—In view of the approaching marriage (July 9) of Mr. Harley Andrew Stephenson, the London officials of the British Gaslight Company, Limited, have presented him with a handsome rosewood-cased clock, with a suitable inscription on an attached brass plate.

A GAS WATER-HEATER.

Davis's "Gilled" Circulator.

DISPLAYED prominently in the window of No. 59, Queen Victoria Street, E.C.—that is to say, the London Show-Rooms of the Davis Gas-Stove Company—there is a section of a new gas water-heater; and should a prospective purchaser of such an appliance step inside, as is likely, in order to make further inquiries as to the merits of this particular form of apparatus, he will see not only other sections, but also heaters in actual working. This idea of showing an article in section is an advantage from the point of view of both buyer and seller. While the former is able to see straightaway the method of operation, the latter does not have to offer the large amount of explanation which would otherwise be necessary; and when the examination of the section can be immediately followed by an inspection of the apparatus at work, then, indeed, is the function of the show-room being fulfilled to the uttermost.

The heater the good points of which are being thus convincingly demonstrated by the Davis Gas-Stove Company is the "Gilled" circulator, which is a compact appliance for connecting to an ordinary circulating system. That the claim to compactness is fully justified will be gathered from a glance at fig. 1 (which is a view of the apparatus in its complete form), and a study of the following dimensions. The circulator is made in two sizes, each tested to stand a working pressure of 60 lbs. to the square inch.

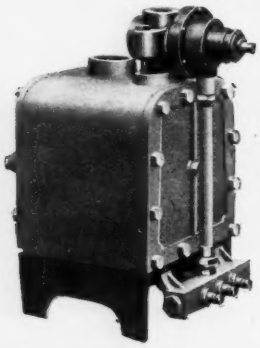


Fig. 1.—The Circulator—Back View.

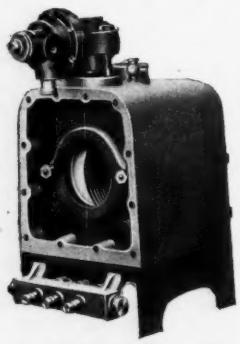


Fig. 3.—Showing Inspection Plate Removed.

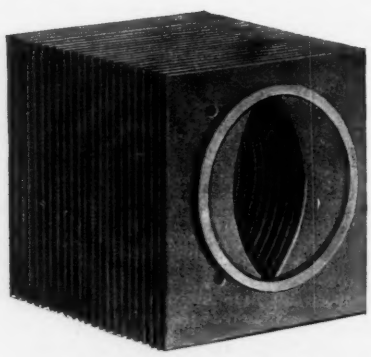


Fig. 2.—The "Gilled" Tube.

The smaller, which is suitable for connecting to a circulating tank of from 20 to 25 gallons capacity, has a height over all of 16 inches, a width over all of 13½ inches, and a depth of 9 inches. The larger, which is for connecting to a tank of from 30 to 35 gallons capacity, is 16 inches high over all, 16½ inches wide over all, and 9 inches deep. A more important consideration, of course, is efficiency; and this it is claimed has been secured in a very high degree by the special construction of the heating chamber, which is practically a tube made up of mild steel gills and rings alternately, welded together by a special process. The gills, or plates, which have given the name of "gilled" to the circulator, extend, as will be seen from fig. 2, both inside and outside the tube. The external gills come in contact with the hot gases of combustion (but not the flame); and the internal ones, with the water to be heated. The result of this form of construction is a very large heating surface in a very small space; the heat taken up by the outside portion of the plates being rapidly conveyed to the water by means of the portion which projects inside the tube. The tube is placed inside a cast-iron water-jacket of the saddle type, which forms a heat insulator, and thus prevents loss by radiation. The water enters at one end of the apparatus, goes through the tube, then flows into the water-space of the jacket, and then passes along the hot pipe by way of a thermostatic valve—when this, from an economical point of view, desirable adjunct is fitted. The object of the valve being to reduce the gas supply when the water has reached a certain temperature, its beneficial effect on the consumption is easily understood. The general action of the circulator will be gathered from the section shown (fig. 4).

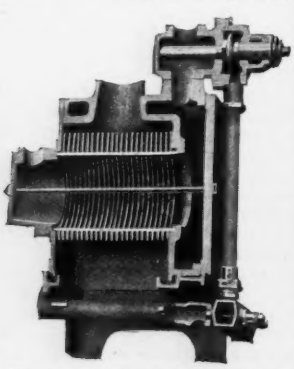


Fig. 4.—A Section of the Apparatus.

Now let us for a moment consider some of the other advantages possessed by this water-heater. In the first place, it may be pointed out that great strength of construction, combined with simplicity of design, ensures a long life for the apparatus. The cast-iron water jacket and the heating chamber should in fact last for an indefinite number of years—particularly when one takes into account the fact that the flame does not at any time come into actual contact with the gills. Further, there are no copper parts whatever in the circulator—a matter on which emphasis is laid by the manufacturers. Then as to accessibility. The removal of a few screws is all that is necessary—without disconnecting either gas or water pipes—to enable one to examine the inside parts. One end portion constitutes an inspection plate, and when, as illustrated in fig. 3, this is taken off—the work of a few seconds—the inspection, and if necessary cleaning, of the interior surfaces of the circulator can at once be proceeded with. What more simple than this could ever be desired? In a similar manner, the gilled portions can be taken out, if required, by unscrewing half-a-dozen nuts at the other end.

A powerful triple cast-iron burner is the heating agent employed; and by merely loosening one screw, this can be easily removed for examination or for cleaning purposes, without in any way disturbing the gas connection. It is pointed out, however, that such removal is very seldom necessary, as special provision is made for dealing with the water resulting from condensation. A feature of the apparatus is the automatic igniter, which is fitted with a pilot-light giving a luminous flame (thus providing against the danger of the atmospheric burners being blown out). The automatic igniter is drawn out to light the pilot; and this action shuts off the main gas supply. The pushing back of the pilot to its original position inside the casing, however, turns on the gas supply again.

In conclusion two more facts only need be mentioned. The circulator, in addition to the pattern which has been the subject of this notice, can be had in a self-contained form. That is to say, a circulator and a 30-gallon water-tank in one—the storage cylinder in this case enclosing the heater. Where existing conditions do not govern the type of apparatus to be connected to a circulating system, the adoption of this pattern might be expected to result in some slight gain over the arrangement by which the heater might be situated in one part of a building and the hot-water storage tank in another. What has been said here may induce those who can conveniently do so to call at the Queen Victoria Street Show-Rooms to see the "Gilled" circulator; but for the benefit of others who are unable to do so, it may be mentioned that the Davis Gas-Stove Company have in course of preparation an artistic illustrated booklet the particulars and diagrams contained in which set forth more fully than it is possible to do in the space at disposal here the advantages that are claimed for this particular method of overcoming the "gas-cooker and hot-water supply" problem.

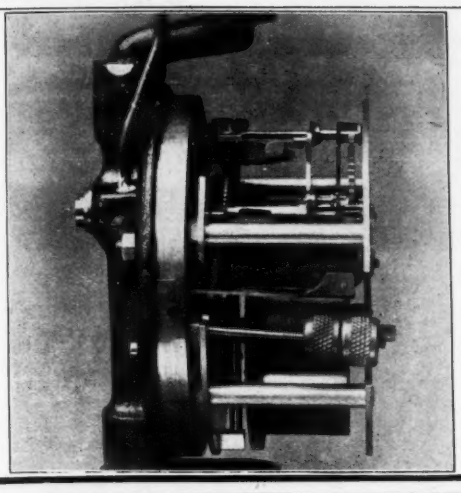
Personal.

Mr. HUGH E. ROBERTS, who was Assistant-Manager at the Carnarvon Gas-Works, has been appointed Manager of the Pwllheli Gas-Works, North Wales. Mr. Roberts, who was formerly employed as Assistant-Chemist at the Manchester Gas-Works, last year won the Bronze Medal in the Examinations in Gas Manufacture.

Obituary.

The death is announced of Alderman G. F. TRAVIS, who for a long time occupied the position of Chairman of the Gas Committee of the Southport Corporation. Deceased, who was only 52 years of age, was elected a member of the Town Council in 1891, and always took an active share in municipal work. In fact, it is said that at one time and another he had been Chairman of every Committee of the Council, which he had also represented on the West Lancashire Water Board. He had been in poor health for some time; and death was due to heart failure.

In a communication to the Paris Academy of Sciences, MM. Berthelot and Gaudechon dealt with the chemical effects of the ultra-violet rays on gaseous bodies. On exposure to these rays, a mixture of cyanogen and oxygen was nearly quantitatively converted into carbon dioxide and nitrogen. Ammonia mixed with oxygen gave as a final product water, nitrogen, and hydrogen. Hydrogen does not combine with oxygen under these conditions. Formic acid was identified among the products of the reaction with a mixture of acetylene and oxygen.



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KLÖNNE'S SYSTEM OF GAS-CHAMBERS.

By M. Paul Parsy.

[Paper read at the Meeting of the Société Technique du Gaz.]

The first paper read at last week's meeting of the French Gas Society—a report of the proceedings at which appears in another part of our present issue—was by M. Parsy. In it, he described several installations of gas-chambers constructed by the firm of Aug. Klönne, of Dortmund, commencing with the inclined chambers put up at Schalke Gas-Works in 1892, the last example of which is the plant at the municipal works of Königsberg, started in 1909. The horizontal chambers described are those built at Rotterdam (1908), Padua (Nov., 1909), Rixdorf (Dec., 1909), and Frankental, near Mayence. The following is a full translation of the paper, with the exception of a few tabulated figures, which have been summarized.

Towards the beginning of the gas industry (about 1850), the carbonization of large masses of coal was tried by Pauwels and Dubochet, and achieved by the Compagnie Parisienne du Gaz in their works at Ivry and La Villette. The ovens were analogous to those then used in the coke industry; for the object was to make metallurgical coke, the market for which appeared to be more advantageous than that for gas coke. It was, however, not lost sight of that gas was the principal product, the make per ton of which should not be reduced, so that the heating of the ovens was done by coke. One realizes the difficulties which these inventors had to encounter (with only fire-bar furnaces at their disposal) to heat chambers containing 6 tons of coal, and the dimensions of which were 2 metres (6 ft. 6¾ in.) wide by 7 metres (23 feet) long. The duration of the charge was 72 hours. The results were not economical; and the system was abandoned without the exact value of the gas made being ascertained, as it was mixed with the rest of the gas made in the works. This was not the object of the experiment, though it would have been interesting, from the technical point of view, to know what it was. What is curious to remember about these trials, however, is that in these original ovens, "the floor was inclined and facilitated the discharge, while in a second system the floor was horizontal, and the discharging was effected by means of a very powerful pusher worked by windlasses, which pushed the coke into masonry quenching boxes" ["Encyclopédie Roret," Vol. I., p. 265]. The economic rock on which the system split was the heating; but, it may be asked, whether success, instead of failure, would not have crowned the efforts of the two inventors, if they had had at their disposal, as modern engineers have, coke producers and regenerative furnaces, which the gas industry only adopted about 1880. At this time, the idea was taken up again; and at the annual meeting in Marseilles in 1883, M. Rodberg read a paper on "An Oven for Illuminating Gas and Metallurgical Coke," which was the outcome of investigations by M. Lencauchez, to whom we owe nearly all the first applications in France of industrial heating by means of poor gas.

This was, however, merely a demonstration, which did not leave the domain of theory. The new method of heating was at its commencement, and was still being discussed even in regard to its application to ordinary retort-furnaces. It is only in recent years that the question has been resuscitated, and has been able to be studied in the full light which gas engineers and contractors now possess on the subject of the carbonization of coal.

A large German firm of contractors, Aug. Klönne, of Dortmund, who for thirty years past have made a specialty of the construction of gas-works, and whose retort-settings are favourably known everywhere, have for some time devoted attention to this problem, and have at the present moment a perfect solution to it. In 1892, they built, at the Schalke Gas-Works, a first setting of inclined chambers, each to contain 5 (metric) tons of coal, able to be carbonized in 24 hours. The results were not what were hoped for; the trial was premature and abandoned. It must be said that then there was little information on the process of carbonizing in bulk, which was not examined and explained as it was some years later by M. Hilgenstock of the Société Otto et Cie., of Dalhousie-on-the-Ruhr, who read a paper* at the forty-second meeting of the German Gas and Water Association, in 1902, at Dusseldorf. This threw new light on the question, and enabled specialists the better to concentrate their efforts into directions likely to lead to success. In this paper, the author investigated the carbonization of coal with the aid of a number of interesting experiments; and he came to the conclusion to adopt a narrow chamber, high and elongated, in which the coal prism would be heated only by the side walls. This chamber, which he advocated for coke-ovens, he also advised for the carbonization of coal for the production of illuminating gas, as he was convinced it would give, with economy, a larger yield and a better quality of gas with gas coals.

About the same time, attention was being directed to the utilization of the bye-products of coke-ovens, and especially of the gas in excess of that required for heating the ovens. Alongside the use of it for motive power, either under boilers or directly in gas-engines, it began to be used for the lighting of towns. In America, where natural gas had long been conveyed under pressure, it was first adopted; and to-day there are several installations of the kind. In Europe, where this means for the utilization of coke-oven gas is less favourably looked upon, it could be adopted in several cases. Certain mining districts would be able, by following what has been done elsewhere, to find economic solutions to provide for interests which have up to now been neglected or badly understood. In Westphalia, there already exist some instances of the distribution of coke-oven gas for public lighting; and a large combination is now seriously talked of, which, if it succeeded, would cause the greater number of the gas-works of the district to disappear. The proposal, in fact, is to lead the gas from coke-ovens to a distance of 50 to 60 kilometres (31 to 37 miles) through wrought-iron pipes or Mannesmann steel tubes, which are rendered necessary on account of depressions in the land of colliery districts. Among existing installations, that of Gelsenkirchen (Westphalia), originally designed for 60,000 cubic metres (say, 2,119,000 cubic feet), reached an output in January last of 50,000 cubic metres (or 1,765,800 cubic feet). The gas is guaranteed to be of 5200 calories, measured at 15° C. and at 760 mm. pressure. It must be stated, however, that this is a standard that is not easily attained with most coal for coking; and it necessitates taking only a certain portion of the gas made during the distillation. The gas is usually delivered at a pressure of 2 metres of water.

The firm of Klönne, who assisted in putting up this special plant, profited by their experience there to examine the new methods of distillation in bulk which they have always had in view; and it has enabled them to arrive at the solution shown in the construction of their ovens which will now be described. So as to arrive at exact figures in comparing the two systems, it was decided to put up at the same time ovens with inclined chambers and with horizontal chambers, the construction of which was begun in 1908—relying in both cases on the data of M. Hilgenstock for the form of the chambers and their heating, which, of course, was to be with coke in regenerative furnaces.

Ovens with Inclined Chambers.

The installation of ovens with inclined chambers was made at the municipal gas-works of Königsberg, where at first two ovens of four chambers, 9·50 metres (about 31 ft. 2 in.) long, each containing 6½ to 7 (metric) tons of coal, were erected. This bench, which was put to work on Jan. 1 last year, has since been completed, as the results surpassed those anticipated. It now comprises six ovens. [The author here gives photographic views of the setting like those reproduced in the "Journal" last year—June 22, p. 837—in connection with Dr. Lessing's Gas Institution paper.] During official tests, from Feb. 12 to March 15, 1909, under the direction of the Manager of the works, M. Kobbert, the following results were obtained:—

(1.) An average carbonization of 52 tons of coal for the two ovens or eight chambers per 24 hours—*i.e.*, 6½ tons per chamber.
(2.) A make of 17,000 cubic metres (say, 600,000 cubic feet).
(3.) Average coke fuel used, 15 per cent.
(4.) The labour required for the eight chambers, charging, clinkering producers, coal handling, and all supplementary work, was 22·65 workmen-hours.

All these results exceeded those guaranteed. Diagrams [given in the paper] show the regularity of the hourly production of gas and of its calorific power. Though the working of these inclined chambers continues to give every satisfaction, it is recognized that the large capital outlay necessitated by their construction is not justified by any appreciable advantage, as compared with horizontal chambers, which are much simpler to erect, stronger, and (above all) less costly.

Ovens with Horizontal Chambers.

It was at the municipal gas-works of Rotterdam that the first trial oven with horizontal chambers was erected. It was put into use on Aug. 9, 1908, and has worked without interruption ever since. It has enabled the working of this oven to be followed in a special manner; and as it is isolated, and has its own sequence of apparatus for condensation, purification, washing, and storing of the gas, it really forms a small experimental plant at the works of Oostzeedyk where it is erected—see "Journal" for Dec. 29, 1908, pp. 902-3.

The space available was very limited, and it was necessary to somewhat restrict the dimensions of the oven. It consists of four chambers, 4·50 metres (14 ft. 9 in.) long by 2 metres (6 ft. 6 in.) high, and with an average width of about 40 centimetres (15¾ in.). The duration of the charge is 24 hours. The chambers are charged through two openings (fitted with self-sealing lids) placed on the top. The discharging is effected by a horizontal pushing machine, similar to those used for coke-ovens. The coke falls on to an inclined surface, where it is quenched by a spray. The chambers are closed at each end by self-sealing lids, which are moved by lifting apparatus. The broken coal is lifted by an elevator and stored in a tank, from which it is taken to each chamber by means of a shoot hung on rails. In order to equalize the cones of coal formed by the charging at the top of each chamber, a rake worked by the machine is used. This levels the coal along the whole length of the chamber. The discharging machine runs on rails, and is worked by an electric motor. The heating of the oven is done by a coke-producer, and a regenerative furnace, on the Klönne system. The circulation of the gases

* See "Journal," Vol. LXXX., p. 1145.

of combustion takes place between the vertical walls as adopted in coke-ovens. In short, it is clearly to be seen that, following the principles stated by M. Hilgenstock, this oven is nothing else than an adaptation of a metallurgical coke-oven to the manufacture of gas.

The gas escapes by an ascension-pipe that is fixed to one of the charging openings, and terminates in a main, where there is a hydraulic seal. The production of gas begins directly after the charge, and increases successively until its maximum is reached about the fifteenth hour. It then diminishes regularly until the end of the charge. The coke at the moment of discharge is in the form of a prism; an empty space of at least 5 centimetres (nearly 2 inches) running along the walls of the chamber, which enables it to be discharged with very little effort. This prism of coke is divided into two longitudinally, which causes it to open out and fall away on the quenching surface. The coke is harder and denser than ordinary coke; but this hardness varies with the kind of coal, its size, and moisture. The ascension-pipes are never stopped up, and it is never necessary to scurf the chambers —thanks to the good distribution of the heat.

Test Results.

Tests were made by the technical staff of the works, from Oct. 7 to 10, 1908, under the control of M. Sissing, the Manager of the Rotterdam Gas-Works. The summarized results are as follows:

The coal carbonized was from the "Hugo" colliery of the Ruhr. An average sample showed (per cent.): Water, 2·45; volatile matter, 28·32; carbon, 59·83; ash, 9·40.

The quantity of coal carbonized during the three days in the four chambers was 33,004 kilos., which produced (reduced to standard) 11,327·9 cubic metres of gas. The average make of gas was, therefore, 343·23 cubic metres per ton of coal carbonized (the equivalent of 12,316 cubic feet per ton).

The analysis of this gas gave, on the second day, the following percentage averages: CO_2, 2; C_nH_n, 3·9; O, 0·4; CO, 7·5; CH_4, 27·7; H, 54·5; N, 4.

The calorific power was taken every hour; and the average of the results was 5541 calories gross, and 4971 calories net. The make of gas per (metric) ton in cubic metres multiplied by the gross calorific power gives a result of 1,901,837.

The coke used for fuel was 5810 kilos. during the tests, without deducting cinders or clinker. The analysis of the coke gave: Water, 3·57 per cent.; carbon, 82·63 per cent.; ash, 13·80 per cent. Deducting for moisture and ash, the consumption was 14·5 kilos. per 100 kilos. of coal carbonized.

The production of tar was 1910·25 litres, or 57·88 litres per ton of coal carbonized. Its density was 1·09. Its analysis gave: Free carbon, 2·54; distillates below 170° C., 2·4; 230° C., 15·4; 270° C., 14·01; 350° C., 21·7; naphthalene, 1·1.

The production of ammonia was 110·235 kilos., or 3·34 kilos. per ton of coal carbonized.

The quantity of coke produced was estimated at 767 kilos. per ton of coal. This coke contained 5·32 per cent. of water, which reduces the make to 726 kilos. of dry coke per ton.

The temperature of the oven, taken on the side walls of the chambers, was 950° C., and in the combustion passages 1210° C. It was, it will be observed, lower than that of ordinary retort-settings, which puts these ovens in the best conditions in regard to upkeep.

So as to make a comparison between the distillation in an oven with chambers and one with retorts (horizontal retorts charged with Fiddes-Aldridge machines or inclined retorts, both with regenerative furnaces), a series of experiments with different coals was carried out. The figures in the third and fourth columns represent the product of the number of cubic metres obtained per ton, multiplied by the gross calorific power:—

Date.	Kind of Coal Carbonized.	Working of Oven with Chambers.	Working of Ovens with Retorts.
		Calories per Ton of Coal.	Calories per Ton of Coal.
Aug. 28, 1908	Hugo	1,801,476	1,626,118
Sept. 24	,,	1,847,356	1,655,290
Oct. 3	,,	1,907,334	1,691,530
,, 7-9	,,	1,901,837	1,738,205
Nov. 3-6	New Pelton	1,660,870	1,738,205
,, 16-20	Rhein Elbe	1,867,630	1,462,860
Dec. 1-5	Hugo	1,715,200	1,479,550
,, 7-9	,,	1,823,318	1,554,142
,, 24-25	Ministre Achenbach	1,816,998	1,554,142
,, 26-28	Hugo	1,782,612	1,644,463
Jan. 26-27, 1909	Burnhope	1,756,800	1,644,463
Jan. 29-Feb. 1	Shaw Cross	1,835,820	1,504,800
Feb. 4-11	Consett	1,704,768	1,519,850
,, 16-18	Single gas nuts	1,698,918	1,519,850

It will be noticed that the results of the summer months are higher than those of the winter. M. Sissing attributes this to the fact that, generally, the collieries send an inferior quality of coal in winter to what they do in summer.

Diagrams are given in the paper showing the influence of the charges on the hourly make, the calorific power, the specific gravity, and the lighting power. From an examination of these diagrams, it is seen that the demands of the works could be met without the necessity of working at night time. With a larger number of chambers, the make could be regulated by avoiding the sharp variations observed at the moment of charging. It will be noticed, also, that the maximum of lighting and calorific power is reached between 3 and 8 o'clock in the evening, which might favourably affect the output when so required. By a mixture in the holders, if desired, an absolutely constant quality of gas could be supplied.

All the figures given were furnished by M. Sissing, to whom the author expresses his thanks. They were taken with the greatest care, with a view to the adoption of oven chambers in the new works proposed at Rotterdam.

Installation at Padua.

The results which have just been given led to the construction at Padua of a bench of four ovens each of four chambers, 6 metres (19 ft. 8 in.) long, of a capacity of 4 tons—*i.e.*, 16 tons per oven, or 64 tons for the whole bench, corresponding to a production of gas of about 20,000 cubic metres (706,330 cubic feet). The two end ovens are divided into two half-ovens of two chambers each, with independent producers and regenerators, so as to form units of 8 tons each. This installation, which was put into action in November last, supplied by itself the gas service of the town during the winter. From the point of view of labour, the reduction has been considerable, because at Padua, the working is done by three squads of eight hours. With the old horizontal retorts with mechanical charging and drawing, to make 20,000 cubic metres of gas per day, 66 stokers were required in the retort-house. With the horizontal chambers, to make 21,000 cubic metres (741,650 cubic feet), it requires one mechanic, only three stokers, and seven labourers. The tar is quite liquid, and does not necessitate any looking after in the hydraulic mains. The ascension pipes have never been stopped.

The results of tests made from Jan. 26 to Feb. 2 last are given, and may be summarized as follows:—

Duration of test, 7 days; in work, 14 chambers.
Coal carbonized (net) 377,189 kilos.
Coke used as fuel (net) 56,335 ,,
Gas made (at standard temperature and pressure) 130,584 cubic metres.
Make of gas per 100 kilos. of dry coal: 34·61 cubic metres (or equivalent to 12,419 cubic feet per ton).
Make of gas per chamber in 24 hours: 1332 cubic metres (or 47,041 cubic feet).
Coke used for fuel—wet: 15·84 per cent.
,, ,, ,, ,, dry: 14·48 ,, ,,
,, ,, ,, ,, net: 13·99 ,, ,,
Make of coke (4000 kilos. of coal produced 3025 kilos. of coke): 75·89 per cent.

Installation at Rixdorf.

A plant of three ovens of four chambers has been erected at the municipal works at Rixdorf (Berlin), and has been at work since December last. Its make, which is 15,000 cubic metres (nearly 530,000 cubic feet), is going to be increased to 25,000 cubic metres (883,000 cubic feet) by the construction of two new ovens.

Installation at Frankental.

We mention, also, the plant at Frankental, near Mayence, the results of which are of special interest to gas-works of average size. It consists of a bench of two ovens, one of which has four chambers and the other three; their length being 5·25 metres (17 ft. 3 in.). The make was intended for 7500 cubic metres (nearly 265,000 cubic feet); but shortly after being put into operation on March 4 last, the output fell to between 5000 and 6000 cubic metres. In order to reduce the make in the same proportion, the oven with three chambers was regulated to carbonize in 36 hours, while that with four chambers continued to work off in 24 hours. The results remained excellent; the calorific value of the gas, ascertained by a Junkers calorimeter, has not fallen below 5000 calories—the average being 5800 calories and the maximum 6800 calories. The make of gas remained at from 34 to 35 cubic metres per 100 kilos. (the equivalent of 12,200 to 12,559 cubic feet per ton) with Saar coal; the expenditure of fuel being 12 to 14 kilos. of coke per 100 kilos. of coal carbonized, with clinkering every 48 hours. At Frankental, the working of the ovens is altogether suspended on Sundays; the last charge being made on Saturday night, and work not being resumed till Monday morning. Not only can night working be got rid of with gas-chambers, but the question of a weekly rest is solved.

We have shown by the results cited that ovens with chambers to-day enter into the domain of the normal carrying on of gas-works, as shown by the lighting of the towns of Padua and Frankental depending exclusively on this method. The principal advantages of this system of carbonization may be summarized as follows: Abolition of night work, which enables a day of eight hours to be adopted without inconvenience; abolition, if desired, of Sunday work, which facilitates the solution of a weekly rest; reduction of labour; higher quality of gas to that from retorts of the same yield; abolition of scurfing, ascension pipe obstructions, and naphthalene; liquid tar and of better quality; yield in ammonia increased by about 30 per cent.; coke harder and in large pieces; less costly upkeep of ovens.

In conclusion, Klönne chambers are in course of construction at the Versailles Gas-Works, at the municipal works of Saint Gilles, Brussels, and at Tilburg Gas-Works (Holland),

ILLUMINATION BY USING INCLINED MANTLES.

By M. Greyson de Schodt.

[A Paper read before the Société Technique du Gaz.]

If the curve of the illumination produced by an incandescent mantle burning in the upright position be traced, it is found—assuming the mantle to be a point—that the illumination is not evenly distributed around this point. Considering the hemisphere below the lamp, it is found in any given plane that 40 per cent. of the total light emitted is projected in a cone (the apex of which is the point of the light source) bounded on one side by the horizontal line passing through this point, and on the other by a line inclined at an angle of 20° below the horizontal; 30 per cent. of the light occurs in a zone defined by two generating lines, one at 20° and the other at 45° below the horizontal; while 30 per cent. is in the space included between this last generating line and the perpendicular passing through the point. This means that in the most common cases—where the light is placed at a height about equal to the radius of the space which is to be illuminated—only 30 per cent. of the total light is obtained on the horizontal plane.

In attempting to obtain a better distribution of illumination, the author has been led to use mantles in an inclined position. The angle will depend on circumstances. It will be greater when illuminating a confined space than in street lighting; but in all cases it can be adjusted to give the maximum light at the spot where the light is actually required. We have to realize the importance not, as hitherto, of the power of the light only, but of its efficient utilization. In an office, for example, it matters not what is the gross candle power of the light; the important thing is to obtain, on the work-table or desk, the maximum illumination of which the light-source is capable.

Though 30 per cent. has been named as the proportion of light of which direct use is made, it is true that some light is obtained from the reflector and from the walls of the room. The reflector on the burner is necessarily of small size, and so reflects the rays of lowest intensity—those nearest the vertical. The proportion of light reflected from walls has been put at 13 to 40 per cent. of that reaching them, according to their colour. The figure for illumination on the floor, when using an ordinary source of light provided with a reflector, may thus be put at 33 per cent.

The author will attempt to show that this illumination may be doubled, and still further increased by the use of inclined burners, without incurring increased gas consumption. The invention is but the application to gas lighting of methods which have long been employed by electricians, who are in the habit of inclining a light-source provided with reflectors so as to produce the maximum illumination at a given spot. In the case of gas lighting, however, this application has involved the production of a bunsen flame which could be used at an angle, as well as of a mantle capable of retaining its shape at an angle without support below. Also means have had to be provided of utilizing the reflected as well as the direct rays of the mantle. The problem of the flame has been solved by providing a current of air able to keep the flame in alignment with the mantle. The mantle is specially prepared and externally supported; and a reflector re-directs the rays of light (which, but for it, would be scattered) upon the mantle. Where sufficient pressure is available, or where the gas (or air) can be used at extra artificial pressure, a chimney for the mantle can be dispensed with.

In giving, now, the photometric measurements showing the economy effected by the inclined burners, it should be stated that they have been obtained in the laboratory of the Société Nouvelle d'Incandescence de Namur, by M. Lamberti, and have been checked by M. Richard, formerly experimental chemist to the Brussels municipal gas service.

Single Burner with Inclined Mantle.

Describing first the single burner, and postponing for the moment the multiple or grouped burners, fig. 1 shows the type of construction. A Greyson burner is provided (between the bunsen and the mantle) with a movable connecting piece, jointed elbow, or circular chamber, which carries a fitting holding the carrier or gallery of the mantle and chimney. The burner is provided below with a needle regulator. In addition to these features, the burner is provided with a slender rod mounted in a holder, and covered with a protecting sheath of magnesia, held in a tubulure forming part of the gallery, so that it is in place even when the mantle is inclined. The reflector is formed from part of the surface of a paraboloid.

The action of the burner is as follows: The gaseous mixture passes into the connecting chamber and ignites on emerging from the metal gauze at A. In consequence of the greater height of the chimney, the draught is sufficient to keep the flame axial and the mantle incandescent throughout its whole length, and this however it may be inclined.

The inclined burner can be used for many special purposes, such as the lighting of shop windows, for which it can be installed at the side, on vertical staging, or on one placed horizontally either above or below the level of the contents of the window. The piece connecting the bunsen and the upper part of the burner being hinged to the bunsen, the mantle can be given the inclination needed for the maximum illumination of a given spot.

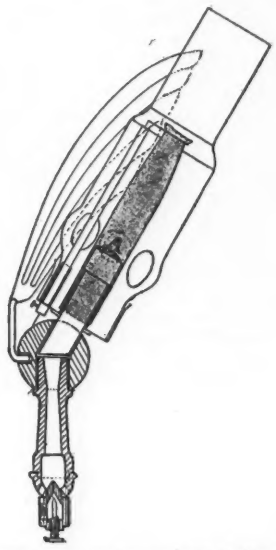


Fig. 1.—The Greyson Burner with Inclined Mantle.

Fig. 2 gives the results of photometric comparisons of two ordinary No. "0" Greyson gas-burners consuming 110 litres—one used upright, the other at an angle of 30° to the horizontal. Both burners were fitted with a reflector of the same kind. The figures given in the diagram are the mean of several observations made at 30 mm. pressure. Similar tests were also carried out with burners consuming 60, 90, 140, and 220 litres of gas. In the case of the upright burner, the maximum intensity of 106·7 candles occurs along the horizontal at the height of the mantle. The variations are traced by the "dot-and-dash" line. The mean spherical intensity of illumination below the burner is here 82·84 candles—equivalent to a consumption of 1·26 litres of gas per candle-hour of mean spherical intensity. The full line gives the illumination with the burner inclined at 30° to the horizontal. Here the maximum intensity of 136 candles is reached at 40° below the horizontal, owing to the better action of the reflector, while the mean spherical intensity is 128·13 candles, equal to a gas consumption of 0·86 litre per candle-hour. The dotted line is that of an inverted Graetzin burner fitted with a reflector

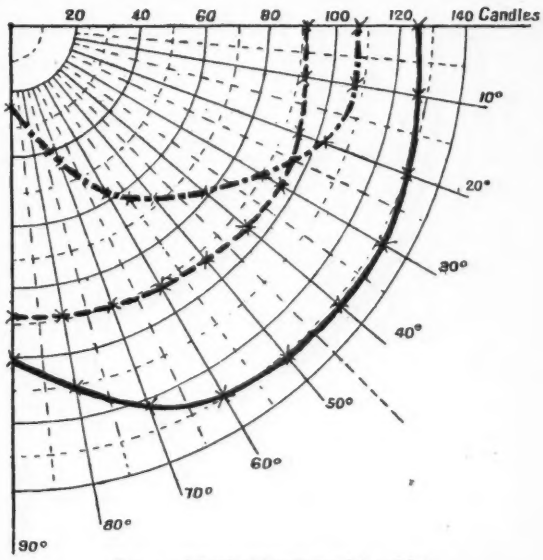


Fig. 2.—Spherical Luminous Intensities.

The Greyson upright burner with reflector is shown by the dot-and-dash line; the Graetzin burner with reflector, by the dotted line; and the Greyson inclined burner with reflector, by the full line. The consumption by the Greyson burners was 105 litres, and by the Graetzin burner, 90 litres. Pressure, 30 mm.

Anticipating the objection that the above may be a particular case, the author has made measurements of the intensity in a plane which is that of the mantle, and also in those inclined thereto at angles of 60°, 75°, 90°, 135°, and 180°. These results are shown in fig. 3 from which it is seen that the solid curves, I., II., and III., corresponding to a sector of 180°, are superior to that of the upright mantle, shown dotted. The curves of illumination corresponding with these different planes (fig. 4) better show the superior illumination; and this demonstration may be pushed still further by working out—as is done in fig. 5—the curve of equal illumination. From this latter, it is seen that, in the case of the upright mantle, the angular measurement of the surface evenly illuminated

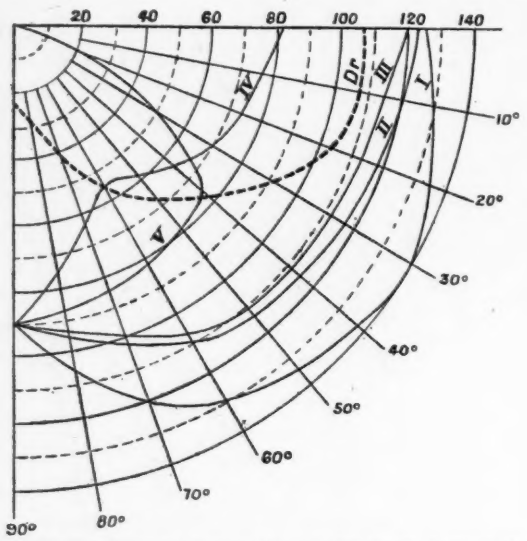
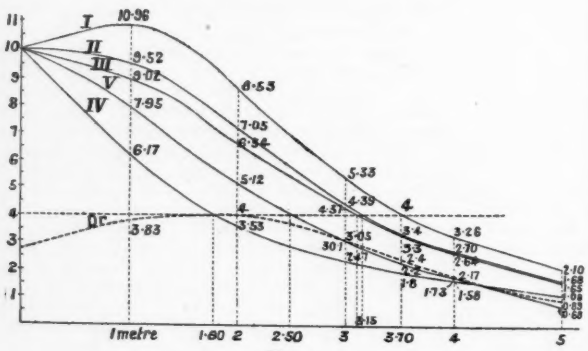


Fig. 3.—Lighting Curve for Greyson Burner with Mantle inclined at 30°.
Consumption, 105 litres. Pressure, 30 mm.


I
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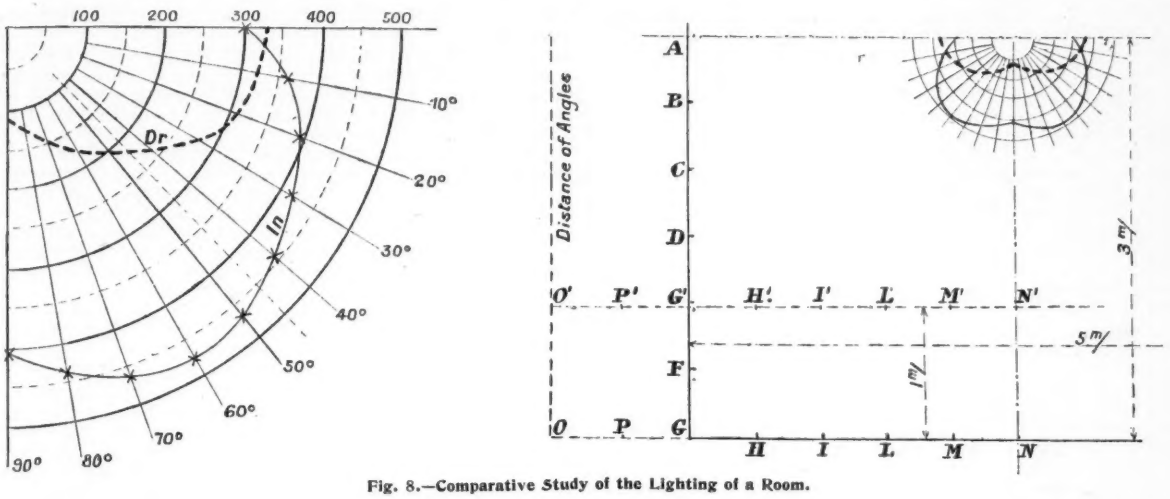


Fig. 8.—Comparative Study of the Lighting of a Room.

groups of three No. "0" Greyson burners of 110 litres consumption. One set was used with upright mantles, and the second with inclined mantles; a similar reflector being used in each case. With the upright mantles, the maximum intensity of 324 candles was obtained along the horizontal; but with the inclined burners, the maximum intensity was 471 candles, and was obtained at an angle of 60° below the horizontal. The mean spherical intensities were 300 and 403 respectively, corresponding with gas consumptions of 1·06 and 0·78 litres per candle-hour of mean spherical intensity. The curves of illumination showed that the light is uniformly distributed around the vertical axis of the apparatus.

To take a concrete example of the differences in the two methods of lighting, the author will assume a room 5 metres square to be lighted by a bunch of three mantles, placed at a height of 3 metres, provided with reflector of the same kind in the cases of both the upright and inclined mantles. Fig. 8 gives the two curves of intensity. From these latter, the illumination of the walls of the room in the two cases may be worked out by the formula

$$E_\alpha = \frac{I_\alpha \sin\alpha \cos^2\alpha}{H^2}$$

while, as before, in the case of the single burners, the curve of illumination on the floor and on a plane one metre above the floor may be calculated. Expressing these results in the figures which best convey their practical significance, it is seen that the illumination on the walls averages 24 candle-metres with the upright burners and 33 with the inclined burners. On a plane one metre above the floor level, the figures are 24·4 and 68·1 respectively. On the floor itself, they are 11·7 and 36 candle-metres—that is to say, with an illumination of the floor of 100 by the upright mantles, the illumination with the inclined mantles will be 308. These figures do not take into account the light reflected from the walls; but the illumination of the walls being about 37 per cent. better in the case of inclined mantles than with upright, the comparison, with this factor allowed for, would be still further in favour of the inclined mantles.

A shop window lighted by two burners, one set inverted and the other set inclined, may be taken as a second example. The two Graetzin burners are assumed to be placed at a height of 1·5 metres; the pair being placed centrally with a separation of 1 metre. The two Greyson burners with inclined mantles are assumed to be placed on the back wall at a height of 1 metre, and 1 metre apart. The respective mean intensities are 43 and 149 candle-metres, equal to an illumination of 324 by the inclined mantles compared with 100 with the inverted. The consumptions of gas are in the ratios of from 90 to 105 or 100 to 116. The inverted burners are given a position 1·5 metres in height in order to ensure the proper illumination of the upper part of the window.

As a third example, the case of a street 12 metres in width is chosen; the lamps being placed 25 metres apart and the mantles 6 metres from the ground. Let us assume the use in the lamps, first of three upright burners and secondly of the same number of inclined mantles. From the calculated curves, it is seen that the mean illumination of the ground with the upright mantles is 2·35 candle-metres; and with the inclined burners 5·89 candle-metres, or a ratio of 100:290 with the same gas consumption.

It will be readily understood that the inclined mantles are susceptible of various arrangements. The burners, or rather the parts above the burners proper, can be placed obliquely, spreading from each other, under one reflector, or several mantles can be mounted on a single large burner. Or, again, the mantles may be placed obliquely round a sphere, or longitudinally in a vertical or horizontal cylinder. The inclined mantle also permits of the system of lighting by reflection being adopted; the burners being mounted in a hemispherical chamber and the light escaping from the upper open side of the chamber being reflected from the ceiling or other screen back into the workshop. Similarly, the horizontal position of the burner can be utilized by placing the mantles immediately under reflectors. The system is thus adaptable to all the conditions encountered in practice; and it affords the maximum illumination at the desired spot—being three times as efficient as other systems in this respect. It may, therefore, claim to be a step forward in lighting by gas.

REFORM IN CONDENSATION.

By M. Grebel.

[A Paper read before the Société Technique du Gaz.]

The author, in dealing with the modern method of treating with tar the gas from the hydraulic main for the removal of naphthalene and the retention of benzol, refers to the forecast of such a method in Bowditch's well-known book, "The Analysis, Technical Evaluation, Purification, and Uses of Coal Gas," published in 1867, in which it was suggested that an efficient method of purification would be to interpose between the hydraulic main and the purifiers proper special apparatus kept at a given temperature, at which the gas and light hydrocarbons would separate from the heavier bodies. The author points out that few of the so-called analyzing condensers designed about 1875 on this principle have survived. Differences of opinion existed as to the temperature at which gas should be treated at this preliminary operation; but the view was almost unanimously taken that the gas should not remain long in contact with the tar. It is bad practice to keep the gas in contact with tar in the cold; but of late it has been found practicable to remove almost the whole of the tar and of the naphthalene at a fairly high temperature, yet retaining still more benzol in the gas. It is an astonishing fact, proceeds M. Grebel, that gas engineers have been so slow in appreciating this good method of condensation, the modern appliances for which have emanated from Germany.

The modern process may be described as consisting of condensation at a fairly high and constant temperature; this condensation being an analyzing or separating process, in which the gas and vapours are treated with the products which condense from them. In other words, by washing the gas with an ample supply of tar at a proper temperature, almost all the vapours, tarry products, and the whole of the naphthalene are absorbed without retaining as much benzol as is taken out of the gas when the treatment is less systematic.

The method raises the question of the removal of vapours from a gas by solvents, in regard to which the author quotes from a private conversation he had with M. Desvignes, following a paper (read in 1908) in which M. Chevalet had recommended the use of a liquid of great solvent action with respect to naphthalene for the extraction of the latter. In order to remove naphthalene, it is not sufficient to discover a liquid in which the naphthalene is highly soluble; it is necessary also to use this liquid in a systematic way. The problem resolves itself not upon solubility but upon vapour tension. When we bring together a gas containing a vapour and a liquid capable of dissolving the vapour, a state of equilibrium is produced between the tension of the vapour in the gas and in the liquid. For example, in the case of the extraction of benzol from the gas of coke-ovens by means of heavy coal-tar naphtha, the benzol is soluble in the naphtha in any proportion—that is, to an indefinite extent. But though the naphtha is an excellent solvent, it is not possible to saturate it with benzol beyond a certain point for any given proportion of benzol in the gas. This point corresponds with the equilibrium of the tension of the benzol in the gas and in the liquid. If this point could be exceeded, the gas would remove benzol from the naphtha, and restore the equilibrium. In practice, the naphtha employed for the recovery of the benzol takes up only from 1 to 2 per cent., and much the same thing occurs in the case of naphthalene.

As Mr. Young and his students have preached, one of the best solvents of the tarry matters and the naphthalene in the gas is

the tar itself. But the process must be carried out scientifically. Of the different methods of treating the gas with tar, one consists in allowing the tar to fall in a finely-divided state down a tall tower (the Klönne process); another, in reducing it mechanically to a fine state in contact with the gas (the Otto method).

In the Klönne condenser, perforated diaphragms, &c., break up the tar into tiny drops, forming a fine rain or mist in the apparatus, in which the gas mixes without appreciable loss of pressure. The crude gas enters the lower part of the condensing tower while it is still warm. The diameter of the tower is about 3 metres and the height about 30 metres. In the case of one erected at the Lünen works, of a capacity of 6000 cubic metres a day, the base forms a reservoir from which the tanks are directly charged. Another large installation is that at The Hague. It consists of four condensers with a total capacity of 150,000 cubic metres per day.

The outside air supplies the cooling action, which, owing to the large size of the towers, is slow and gradual. As the gas in its passage meets the tar coming in the opposite direction, this latter and the hydrocarbons with it undergo a species of fractional distillation to the advantage of the lighting power of the gas. These more volatile hydrocarbons which tend to condense in the upper part of the tower are re-absorbed by the ascending stream of gas. Benzol cannot remain in solution in the tar which collects at the base of the condenser, since the temperature here is practically that of the incoming gas, or about 60° C. Moreover, a steam-coil may be used to keep the tar at a constant temperature.

On the other hand, the intimate contact with the constituents of the tar capable of dissolving naphthalene retains this latter completely. At the temperature of the outlet of the condenser, which is about that of the outside air, the naphthalene cannot escape solution, nor can it be taken up by the gas. According to Schäffer (as translated by M.M. H. Marquisan and Ph. Delahaye) "the chemical analysis of the tar separated in different works by the Klönne coolers shows that this tar is richer in naphthalene than that produced in works where cooling is done more rapidly." The following two analyses were made at Dortmund and Bochum respectively:—

	Per Cent.		Per Cent.
Ammoniacal liquor	5·6	..	7
Light oils	2·4	..	8
Naphthalene, dry	12·6	..	14
Medium oils / Heavy oils	10·4	..	27
Anthracene	—	..	3
Pitch	68·0	..	41
Loss by distillation	1·0	..	—

Now the tars from gas-works and coke-ovens in Germany contain, as a rule, only 4 to 7 per cent. of naphthalene. Owing to the higher proportion of light and medium oils in it, compared with that from the hydraulic main and the usual condensers, the Klönne tar is fairly fluid.

There is no antagonism in the two operations which go on in the condenser—viz., the absorption of the naphthalene and the retention of the benzol by the gas. The boiling points of benzene and toluene, 80° and 110° respectively, are widely removed from those of naphthalene (210°) and anthracene (350°); and thus the difference in the vapour-tensions of the two classes of body permits of a very complete separation of them within moderate limits of temperature. The temperature of the tar which collects at the base is about 60°, or 20° above that of the outlet. In order to regulate the latter, there is fixed a bye-pass, which takes off part of the gas mid-way up the condenser. Since, in cold weather and in the case of a small make, this bye-pass can be used full open, and half of the cylinder is thus put, practically speaking, out of action, it will be understood that the constructors have been led to build their apparatus of very considerable height. In some cases a series of bye-passes have been fitted at points at various heights.

The way in which the gas circulates in the condensers is of great importance. The speed should be slow enough not to reverse the current of the fine stream of tarry particles—that is, not to take these latter with it from the outlet. The Klönne firm have not given many details of the arrangements at the outlet, nor of the means which they adopt to induce the state of mist in the tar. The best testimonial to the working of the installations which have been erected is that a species of chart or table is now issued by which the gas-maker can work under various conditions. The spraying arrangement also permits of the trellis diaphragm being cleaned from time to time.

The author must express a preference for this principle of condensation over that of the naphthalene trap. When this latter is used, there is still plenty for the Pelouze and Audouin condenser to do; while, on the other hand, it has been stated by the Director of the La Haye works that after the gas has passed the Klönne apparatus, all the other condensers can be dispensed with. In many works the condensers previously in use absorb ammoniacal liquor, which is scarcely coloured with light oils on the gas being first passed through the Klönne condenser. It should be added that the proper place for the Klönne is as near as possible to the hydraulic main, so as to secure the maximum of condensible products. As an experienced gas-maker remarked to the author, "It is not difficult to see the reason for this; we cook the gas in its own juice."

The Otto system (information in regard to which the author owes to M. Sauvet, who has had the opportunity of seeing the apparatus at work at Julia and Vondern) is applied to coke-furnaces where as a rule there is a dry hydraulic main. The gas emerges from the main at a temperature of from 160° to 170°. This is brought down to 80° in coolers before the gas enters the Otto apparatus. This consists of a long horizontal main, about two-thirds full of tar. On the top of the main are symmetrically placed three tuyers for the inlet, and three for the outlet, joined by separate collectors. In the inlet tuyers finely-divided tar is injected in the direction of the flow of the gas. The tar is not intermingled with a vapour such as steam under pressure; it is injected "neat," by the turbine pumps, under a pressure of 0·60 kilo. The tar which is thus absorbed in the apparatus, and circulates in a closed circuit, meets the surface of the tar in the main at the same time as all the naphtha oils which it has itself absorbed. The three injectors can be placed in action together or one or two at a time.

Immediately following the injectors in the Otto process is a saturator containing sulphuric acid, in which the so-called process of "direct sulphuration" is conducted. In this, the fixed (combined) as well as the free ammonia is converted into sulphate without, of course, any distilling with lime. Contrary to expectation, the saturator does not heat. In the distillation process for making sulphate, it is not the dry steam which causes the bath to heat, but the large quantities of water mechanically brought into the saturator—the quantity of steam being quite minute. The gas itself in the old process contains only saturated steam; and the temperature at the outlet of the saturator is the same as that at the inlet. No tar is carried forward to the saturator or to the subsequent apparatus in which the gas is cooled to 25° before being treated with the heavy naphtha for the extraction of the benzol. The only product is water, slightly coloured.

Washing with tar at the high temperature of about 100° is an essential feature of the process if the whole of the ammonia, both free and combined, is to be obtained in the saturator. At temperatures which fall appreciably lower than 70° to 80°, the fixed ammonia compounds are to a large extent condensed along with the water, which also retains a little of the free ammonia (as in the Koppers direct saturation method).

It will be understood that the manufacture of the sulphate in this direct manner possesses several advantages; a commercial product being obtained without the expense of washing or distillation. The sulphate is very slightly grey, but is not to be compared with the crystals, floating in a dark liquor, such as the author has seen produced in the Mond apparatus. The objection that has been raised against the process is that the sulphuric acid itself and the hydrochloric and hydrocyanic acids which are liberated by it, give rise to attacks. This can be remedied by once washing the gas and passing it once through a purifier before treating it with the naphtha. As a whole, the Otto system appears to have been brought to a pitch of perfection.

The Klönne and Otto processes having demonstrated the beneficial effects of treatment with finely-divided warm tar, the author has considered whether such action might not be secured in a less elaborate apparatus. It is certain that the ordinary perforated washer would be altogether inefficient, as would also coke-towers, &c., unless employed for the very fluid tars obtained from vertical retorts.* But a finely-divided and even stream (or mist) of tar could be obtained in tall empty scrubbers by means of pumps for the tar and suitable distributors. Existing scrubbers would be usable for this purpose so long as their diameter was large enough for the gas to circulate slowly, and to avoid taking up the tar mechanically. The outlet temperature would be controllable by that of the tar admitted, and to a certain extent by the quantity of tar. Such an arrangement would have the advantage of being adaptable to the more recent methods of making sulphate, such as the Koppers and the Feld† processes. In the former, the wet hydraulic main lowers the temperature of the gas to the necessary 60°, while the latter makes use of the sulphur in the gas in forming the ammonia compound—the sulphur being first converted into sulphurous acid and ferrous sulphate.

* M. Allner pointed out in the "Journal für Gasbeleuchtung" for June 5, 1909, that the tar of vertical retorts can be used in place of anthracene oils in the naphthalene washers. The tar was capable of taking up 13·6 per cent. of naphthalene and removing 0·371 gm. per cubic metre from the crude gas, causing less loss in lighting power than heavy oil.

† Strictly speaking, the description "direct sulphuration" applies more appropriately to the Feld process than to the Otto or Koppers processes.

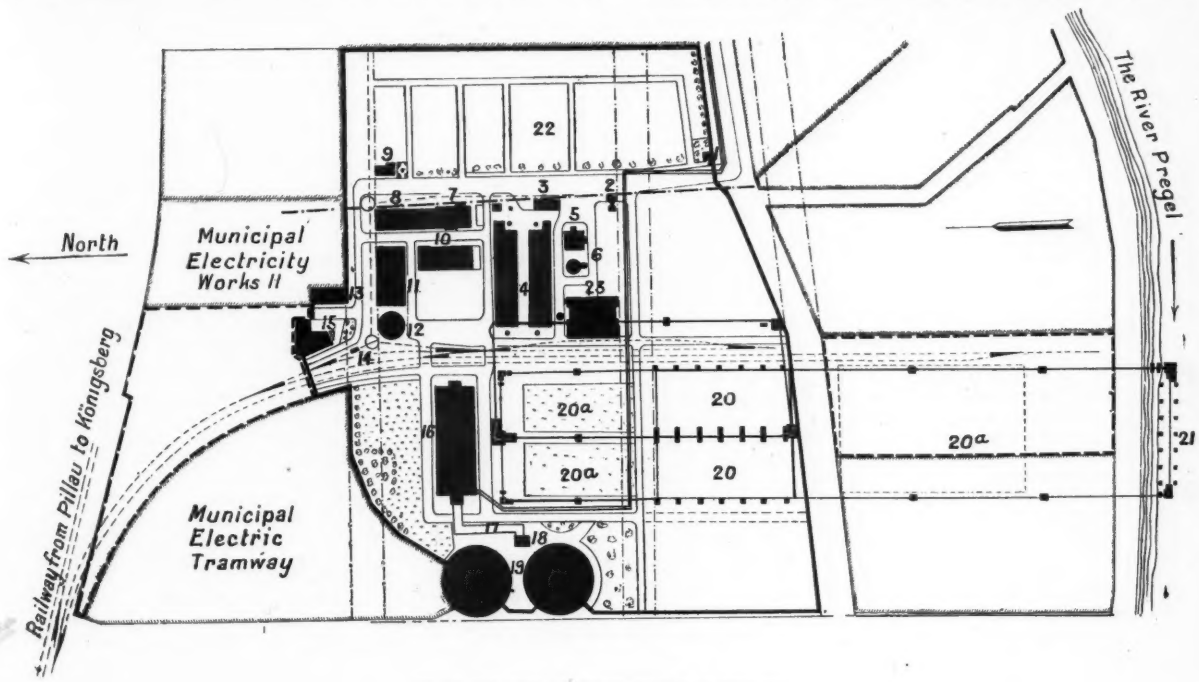
The Junior Institution of Engineers.—Arrangements are being made for the summer meeting of the Institution to take place at Dublin and Belfast from the 16th to the 23rd prox. The programme opens with a reception at Trinity College, Dublin, by the Provost and Professors of Engineering, and an inspection of the Engineering School, &c. In the evening, the Institution of Civil Engineers of Ireland will entertain the members and ladies accompanying them. Among the visits will be one to the Corporation's new reservoir under course of construction at Roundwood; Mr. John G. O'Sullivan, the City Engineer, acting as guide. In the evening, the party are to be the guests of the Engineering and Scientific Association of Ireland. At Belfast, on the 21st, the Lord Mayor (the Right Hon. Robert J. M'Mordie, M.A.) will receive the members at the City Hall, and entertain them at luncheon. On Friday, the 22nd, there will be the Institution's summer dinner. It is hoped the President (Engineer Vice-Admiral Oram, C.B., Engineer-in-Chief of the Fleet) will be in the chair.

THE KÖNIGSBERG GAS-WORKS.

A HISTORICAL account of the development of the municipal gas undertaking of Königsberg, in Prussia, and a description of the gas-works there at the present time were given by Herr Kobbert, the Manager of the gas undertaking, in a special pamphlet which had been prepared by him for distribution to the members of the German Association of Gas and Water Engineers on the occasion of the annual meeting of the Association at Königsberg on the 20th to 24th inst. Having regard to the great development which has taken place in the sale of gas in Königsberg under Herr Kobbert's management of the undertaking, and to the many more or less novel methods of working which he has introduced on the works, we have prepared from his pamphlet a short account of the more interesting features of the works.

HISTORICAL.

So long ago as 1825, an English company made an offer to introduce gas supply in Königsberg; but the Corporation considered the proposition premature. In 1845, proposals were renewed by private companies for the erection of a gas-works, but it was then thought that the works, if erected, should be in the hands of the Municipality. In 1848, Herr G. M. S. Blochmann, who had erected the Stettin Gas-Works, laid a project for a gas-works at Königsberg before the authorities; and in 1850, a detailed scheme was worked out by Herr Kühnell, of Berlin. The latter scheme was approved by the Municipal Council in September, 1851; and on Nov. 13, 1852, gas from the new works, erected according to the scheme, was first used for public lighting. The progress of the gas supply in the town was thenceforward continuous and rapid. Considerable extensions of the works were required in 1857-8; and in 1863 a new retort-house, condenser house, coal-store, and boiler and engine house were erected. In 1870, new tar-wells and coal-store were completed, and in 1871 a fourth gasholder. By 1873, six new purifiers and a station meter had become necessary; and in 1877 an engine-house and twelve new beds of seven retorts were erected. A fifth gasholder and offices were required in 1881; and in 1893 a new plant for working up liquor was introduced. The sales of gas in 1858 amounted to about 53,394,000 cubic feet, and had risen by 1885 to 176,631,000 cubic feet, and by 1900 to 315,680,000 cubic feet. Thenceforth the increase in the sale of gas was extremely rapid. In 1905, the quantity sold amounted to 501,158,000 cubic feet; in 1908, to 643,224,000 cubic feet; and in 1909, to 677,021,000 cubic feet. In 1895, it became evident that a new gas-works would be necessary, and it was finally decided in 1897 to erect the same. As, however, the productive capacity of the old works had proved insufficient in the winter 1897-8, a water-gas plant was installed in 1898, which served to meet the demand for gas for a few years longer. The gasholder capacity was, however, inadequate; and consequently a gasholder was the first item erected on the new works. This was brought into action in



PLAN OF THE KÖNIGSBERG GAS-WORKS.

1. Gatekeeper's house.
2. Conveyor weighing-machine.
3. Coke-breaking and sorting plant.
4. Retort-houses.
5. Water-gas plant.
6. Relief gasholder.
7. Offices.
8. Stores and shops.
9. Tinsmiths' shop.
10. Condenser and washer house.
11. Boiler-house and sulphate plant.
12. Reservoir tower.
13. Baths.
14. Waggon weighing-machine.
15. Workmen's canteen.
16. Purifier, meter, and governor house.
17. Mains to valve-house.
18. Valve-house.
19. Gasholders.
20 and 20A. Coal-storage sheds and sites for extensions of same.
21. Coal-unloading berth.
22. Coke-yard.
23. Carbonizing chamber settings.

the autumn of 1901. The rest of the new works was then so far advanced that the first of the retorts were charged in July, 1902, and gas was supplied from the works on the 2nd of August.

DESIGN AND PLAN OF THE NEW GAS-WORKS.

When the question of the extension of the old works or the construction of new works was considered in 1896, it was found that all the land available for extension would have been sufficient to raise the productive capacity of the gas-works to a daily make of only about 2,650,000 cubic feet. There would have been the further disadvantage about this extension, that the new portion of the works would have been separated from the old by a public thoroughfare. Moreover, the foundations of the existing buildings of the gas-works were inadequate to carry the heavy load of modern plant, and would have suffered from the erection of any modern buildings adjacent to them. Finally, it was impossible to get railway communication to the works, and the site of the old works also had a very high value for building purposes in the course of the development of the town. For these reasons it was decided to erect new works in a more favourable position. It was necessary that the works should be on the River Pregel, and it was desirable also that it should have railway communication. Close to the town boundary the only site available which fulfilled these conditions was one in the immediate neighbourhood of the fortifications; and a condition in regard to building there was that the buildings should be of a light and temporary character, so that they could be readily razed. Having regard, however, to the importance of the gas supply to the city, and to the desirability of the works being close to the walls and so protected by the fortifications, a relaxation of this condition was made in respect of the gas undertaking by the military authorities, to whom the Municipality gave written guarantees and a sum by way of compensation for any interference with the existing fortifications. In September, 1896, the required land was bought on favourable terms. Seeing that the position of the site on the River Pregel and adjoining the railway line to Pillau was so satisfactory, it seemed desirable ultimately to transfer the whole of the gas-works plant to this site, where there was ample room for all probable requirements in the way of extensions. The matter was debated, and doubts were expressed in the Town Council as to whether any such development of gas supply as would justify the undertaking of such a scheme of transfer and extension was probable. These questions were discussed in a report which Herr Kobbert presented to the Council in May, 1897, in which he dealt with the

question of the bearing of acetylene and of water gas manufacture on the future of gas supply. Ultimately the Town Council on Sept. 7, 1897, decided to erect a new gas-works on the site referred to, to ratify the proposed agreement with the military authorities, and to proceed with the preparations for the erection of the works by way of inviting competition for designs. A sum of £1500 was set aside for promoting the competition, of which total £1200 was later assigned for prizes for the three best schemes submitted. As a result of this prize competition, the prizes were awarded on Aug. 26, 1898, as follows: First prize, to the Berlin Anhalt Engineering Company, of Berlin, in conjunction with the Stettin Firebrick Works, of Stettin; second prize, to Herr Pohmer, Engineer at the Hanover Works of the Imperial Continental Gas Association; and third prize, to Herr Robert Schilde, Works Superintendent of the No. 2 Gas-Works of the Leipzig Corporation. The judges, however, in awarding the prizes stated that none of the schemes submitted could be recommended forthwith as a basis for the projected works.

The Lighting Committee of the Municipality, having regard to this view of the judges, decided a month later to have an independent general scheme for the new works drawn up by the management of the gas-works. This was done, and the scheme was ratified by the Municipal Council on March 16, 1900. It had special regard to the conditions laid down by the military authorities. The boundary of the site to the east of the fortifications formed the western limit of the coke yard and the other storage ground. The available frontage to the River Pregel amounted to only about 590 feet, and the coal-stores were arranged directly behind this. Railway communication was obtained by a connection having the smallest permissible radius with the line from Pillau to Königsberg. The holders, designed to take the entire make of the gas-works, were relegated to the western portion of the site, which is that farthest away from the fortifications, and consequently the retort-houses and other works buildings were necessarily placed between the coke yard and the coal-stores. The new works were constructed immediately for a daily productive capacity of 50,000 cubic metres (1,750,000 cubic feet); but the site was sufficient for extensions to a daily make of 200,000 cubic metres (about 7,000,000 cubic feet).

A plan of the new works is given on p. 955. It will be seen that the site is cut by three roadways, between the first two of which is the largest available space, and on this the chief works buildings were erected. It was decided that, with a view to subsequent extensions, provision must be made for the stream of gas to have two ways by which it could travel from any point on the works. This entailed the establishment of two systems of works' mains, either of which it was decided must be adequate for the maximum requirements of the purifying or other works' plant. The buildings were to be constructed of such an area that they would contain apparatus for a make of at least 3½ million cubic feet per diem, with the possibility of ready extension for a make of double this quantity. The nature of the site—which for the most part lay in an old bight of the bed of the Pregel—entailed that a framework of piles should be used for any appreciable load, the length of piles requisite being from 40 to 56 feet. The position is only about five miles from the mouth of the Pregel, and the water-level therefore varies with the direction of the wind, rising to as much as 5 feet above the normal level. It was decided, therefore, that the roadways on the works should be 6 to 6½ feet above standard water-level, and that there should be no underground cellars with, of course, the exception of the water-tight tanks. Rain water and clear effluents are discharged direct into the Pregel; but other drainage passes through a sludge pit, and is thence pumped into the town sewers.

Retort-Settings and Coke Conveying and Sorting Plant.

The carbonizing plant was installed according to the ideas which prevailed in the gas industry in the summer of 1900, when inclined retort-settings were in favour, and it was not settled that long retorts were superior. Consequently, the carbonizing plant erected, consisted of 24 settings, each containing nine inclined retorts, 3½ metres (11 ft. 6 in.) long. These were disposed six settings in one bench with a chimney, and each retort-house contained two benches. The settings had producers set in them on the discharging side. The main flue of the producers was placed on the ground level on the charging side of the settings. The whole of the producers and the bottom of the main flue were above ground, because of the high level of underground water, so that the discharging stage was raised 10 feet above the ground level. The retorts are of large cross section, and take charges of about 5 cwt. The average weight of a charge of English coal to be worked off in six hours is about 4½ cwt. Each bed has a separate hydraulic main, with separate tar and gas outlets. In addition to the regular tar overflow, there is a cock at the bottom of each hydraulic main for drawing off the tar at intervals. By this arrangement, it has been found possible to work English coal without special cleansing of the hydraulic mains. The ascension pipes are 7 inches in diameter. The gas connections from six settings terminate in a foul main 18 inches in diameter, and the four foul mains run into two mains 34 inches in diameter, either of which can be used alone if desired. This alternative provision has proved to be very useful as a precaution in case of stoppages from thick tar.

Above the settings is a coal bunker, with partitions so that each setting has its separate store of coal. The scraper conveyor runs above the bunker with a slide over each section for discharging the coal. Alongside the bunkers is a narrow-gauge railway with waggons of 18 cubic feet capacity, which can be emptied into any bunker through an opening in its side wall. These openings are closed by flaps when this reserve conveying plant is not in use. Work was started in 1902 with the reserve plant for conveying the coal. The apparatus for discharging the coal-ships on the Pregel, and the coal-sheds and coal-conveying plant were not then installed. The coal was discharged from lighters into tipping-trucks of about 1 cubic yard capacity as on the old gas-works, and these trucks were drawn by horses to the works. The coal was similarly taken from the store to one of the ends of the retort-house. At each end of the retort-house was a lift for the trucks, which were thereby raised up to the narrow-gauge railway that runs alongside the coal bunkers. Since the installation of the mechanical coal conveying plant, however, the coal comes by a rope line to the western ends of the two retort-houses. The waggons of the rope line are discharged into small intermediate receivers, from which the scraper conveyor (already referred to) takes the coal into each retort-house and discharges it into the coal bunkers. The coal passes from the bunkers into the fixed measuring chambers, of which there are three over each setting. By the moving of a lever, the measuring vessel is caused to discharge its contents into a travelling shoot which is brought under it, and which enters the mouthpiece of the retort. There is a travelling shoot for each row of retorts in each bench. The coke is discharged red-hot from the retorts into the producers by the aid of a two-wheeled waggon. The producers are recharged at intervals of two to four hours, and clinkered once a day. The rest of the coke is shot into a trough, containing water, placed beneath the discharging stage. This trough is covered, and is provided at the end with a steam escape pipe. The trough is provided with a draw chain conveyor, and the water circulation is maintained by means of a centrifugal pump. At the end of the trough the coke passes under a sprinkler, to ensure that it has been completely quenched, and then falls into a receiver, from which it is raised by an elevator to the coke breaking and sorting plant. This plant contains Krupp's hardened steel drums by which the coke is broken. The coke is sorted into four sizes, of which the dust or breeze is used mainly as boiler fuel on the works, though a small quantity of it is sold for household use. There are ten receivers for the sorted coke, one of which is for breeze, three for the largest, four for the medium-sized, and two for the small coke. Carts can be loaded directly from these receivers, and there is a small band conveyor which takes the coke from openings in the sides of the receivers to railway waggons on an adjacent line. The conveying plant, pumps, and auxiliary apparatus are driven by electric motors, the current for which is supplied, at 500 volts, from adjacent electric works.

The carbonizing staff works in three shifts; the labour being apportioned as follows: Three men for each bench of six settings to charge and discharge the retorts, charge and clinker the producers, and clean the retort mouthpieces and the stages; one man for each retort-house (containing two benches) to clear ascension pipes and generally look after the retort-house equipment; one man to work the elevators and coke breaking and sorting plant. One bricklayer will generally be engaged on the settings for two out of the three shifts, and one smith or mechanic, with a labourer, may be required on the fittings for one shift a day. The retort-houses are on brick foundations raised on a framework of piles 40 ft. to 52 ft. 6 in. long. This framework extends under the whole area of the retort-house. The settings themselves are built on a concrete platform 2 feet thick, between which and the plank bottom over the pile foundation is ballast. The retort-house consists of a lattice framing filled in with rammed concrete from 3 to 4 inches thick, with wire insertion. All the principal columns of the iron framework are stiffened at the height of the stage by a horizontal lattice girder. In order to reduce the width of the roof, a low lean-to lattice glass roof has been erected over the discharging stages, so that only the span roof resting on the principal column is as high as is required for the coal conveying plant. The iron span roofs are covered with grooved tiles. There are in the roofs three dust exits over each bench of settings, consisting of truncated pyramids of iron framing with rammed concrete walls. A passage 40 inches wide leads in each retort-house to an iron framed and cement and lattice tiled structure, which contains a dining and rest room (242 square feet in area) for the stokers, a 307 square feet dressing-room, and five rooms each containing two shower baths.

The Condenser and Washer House.

The two 34-inch mains from the two retort-houses diminish at the north side of the No. 1 retort-house to 24-inch mains, and then run above ground to the condenser and washer house. At the south end of this house an annular condenser, having a cooling surface of 1560 square feet, stands in the open. The apparatus contained in the house is divided into two sections by a gas-tight seal, and each section can be worked independently of the other. The washer-house is divided into three rooms by two partitions. In the first room, there are two water condensers, having 3700 square feet of water-cooling surface and 570 square feet of air-cooling surface. There is room for a second installation of the same size. The second room contains the exhausters, of which two—of the three-blade type, having a capacity of 80,500 cubic feet per hour when running at 80 revolutions per minute, and driven by horizontal steam engines—have so far been installed. There is room for a third exhauster of the same size. In the

upper part of the exhauster room is a travelling crane to remove any parts of the exhausters when required. In the third room, there are placed a Pelouze and Audouin tar extractor for 1,750,000 cubic feet per diem and the Pelouze extractor which was erected in the old works in 1896, of 1,225,000 cubic feet per diem capacity. There is room for a third extractor of the same size as the first. There is a washer for cyanogen extraction according to Dr. Bueb's process, driven by a vertical steam-engine, of a capacity of 1,750,000 cubic feet per diem; and space has been allowed for a second washer of the same size. There are two ammonia extraction washers of the "Standard" type, driven direct by vertical steam-engines, of a capacity of 1,750,000 cubic feet per diem. Space is allowed for a third similar washer. A water-tube condenser, with 1765 square feet of water-cooling surface and 270 square feet of air-cooling surface is placed between the cyanogen and ammonia washers.

The general arrangement of the apparatus in the house is such that the gas can pass to it from either of the large works' foul mains, and that space should be available for the installation ultimately of apparatus for a daily make of 3,500,000 cubic feet with 50 per cent. reserve in tar extractors and washers. Great care has been taken that all the connections should be readily accessible. In order to utilize ground area and diminish the high cost of foundations, the space between the pile framework and the floor has been utilized for tar and liquor tanks. Above the floor level is a chamber for the gas and tar and liquor mains. This chamber has a perforated floor, so that there is ample ventilation when work is being carried out on the mains. Two steam-pipes, each of sufficient size to supply the whole of the engines, come into the house from the boilers. Communication between the three rooms of the house is established by means of an open concrete gangway on the eastern side, to which access by staircases at both ends is provided. The tanks for tar and liquor have double lids. The tar and liquor from the apparatus pass through an 8-inch main into a separating tank, from the bottom of which the tar passes into the first tar-tank, and the liquor runs through an overflow into the first liquor tank. The liquor is then pumped through lead pipes by two pulsometers up to an overhead tank of 1400 gallons capacity, from which it passes to the distilling plant. There are also two cylindrical vessels, hermetically closed, to receive cyanogen sludge from the cyanogen washers.

PURIFIER AND GOVERNOR HOUSE.

The gas passes from the washer-house through two underground cast-iron mains, 20 inches diameter, to the purifier-house. The purifiers are arranged in two sets, both of which can be fed from either main. At first only four purifiers, each having an area of 690 square feet, were put in. The purifiers are of the usual cast-iron pattern, with wrought-iron lids with water-seal. The vessels stand 7 ft. 6 in. above ground level, on an iron structure of piles; and 40 inches above the lower edge of the vessels and 26½ inches beneath the upper edge of the cups, is a perforated wood working floor. There is, 18 ft. 6 in. above this working floor, a concrete roof to form the revivifying floor, which is asphalted. The floor is perforated at four points by iron ventilating shafts, 43 square feet in cross section. These shafts pass through the revivifying floor and the roof of the house to the open, having a wind protector at the top. Beneath the roof ties is a wooden floor on which new or entirely spent oxide can be stored. The roof has a lantern with fixed louvres, so that the revivifying floor is freely ventilated. Over each set of purifiers there is a travelling crane with four hooks to raise the lids of the vessels. Above each vessel there are two openings in the revivifying floor through which the material for charging the vessels is passed down two shoots into the vessels. The shoots are carried by the travelling crane. The vessels are discharged through four openings in the bottom on to four shoots leading to a Bradley conveyor, which removes the fouled oxide to any part of the revivifying floor.

(To be continued.)

Woodall-Duckham Verticals for Lausanne.—It is not very often that one sees gas-works contracts noticed in the Engineering Supplement to "The Times;" but last Wednesday the success of Messrs. Woodall and Duckham in connection with the Lausanne Gas-Works was referred to in the following terms: A correspondent informs us that a new gas-works at Lausanne is being built and equipped by Messrs. Woodall and Duckham, Limited, of London, who obtained the contract, amounting to about £30,000, in the face of keen German competition. The firm's patent system of vertical retorts is being installed. The retort-house, which is to be ready by September next, is a brick-lined steel structure, 140 feet long, 50 feet high, and 36 feet wide, standing between the coal and coke stores. From the coal-store, which has a capacity of 8000 tons, and is supplied by means of a private railway siding, the coal is taken by conveyors to hoppers in the retort-house, whence it is fed automatically into the retorts. The carbonization will proceed continuously; the coke, by means of revolving prongs arranged spirally, being mechanically extracted from the bottom of the retorts and sliding down shoots to conveyors that take it to the coke-store, which has a capacity of about 5000 tons. The retorts, numbering 48, are arranged in sets of four, and are designed to deal with 120 tons of coal a day, producing 1½ million cubic feet of gas. The fire-clay retorts, the castings, and much of the material, have been imported from this country. The contract also includes the erection of a brick shaft 130 feet high and 16 feet square.

INFORMATION ABOUT GAS COALS.

A CONTRIBUTION BY DR. KARL BUNTE TO THE REPORT OF THE COMMITTEE FOR THE INSTRUCTIONAL AND EXPERIMENTAL GAS-WORKS OF THE GERMAN ASSOCIATION.

It will be seen from the report of the Committee that the Instructional and Experimental Gas-Works at Carlsruhe have made experimental determinations of the yield of gas with German gas coals from 52 different pits, which comprise the greater number of those from which coals are used in considerable quantity for gas making. The material collected through these determinations affords a fairly comprehensive view of the procedure of gasification in general, as well as of the behaviour of individual coals. But in Germany about 25 per cent. of the coal carbonized is of English origin; and the systematic investigation has, therefore, been extended to a number of English gas coals. A provisional report of the results so far obtained with the latter has been prepared for presentation to the meeting of the Association. This shows the gratifying result that, generally speaking, from the pits in question characteristic English coals are obtained in Germany; and it is hoped that the results reported will be considered to warrant a continuation of the investigation. As soon as the study of the English coals has been completed, it is intended that a comprehensive report should be prepared on the whole of the results obtained to date at the experimental works. At the present time, the author wishes merely to indicate, in a few words, the fundamental ideas to which the investigations of gas coals have led, and the manner in which it is hoped to secure a basis for the valuation of gas coals.

The first question that arises is, naturally, What are gas coals, and in what respect do they differ from other coals? They come between the coke-making coals which are poor in gas, and the coals which are rich in gas but cake poorly. The proportion of carbon in the coal substance (*i.e.*, dry and ash-free coal) lies between 81 and 87 per cent., and the calorific power between 13,950 B.Th.U. and 14,760 B.Th.U. per pound. Two of the most important factors for the valuation of a gas coal are that it must fall between these boundary lines—between flaming and coking coals, or coals which are rich in gas and coals rich in coke. Gasification is a process for enhancing the value of a fuel, since its action essentially implies that the whole weight of the raw material and its whole content of energy—*i.e.*, its calorific value—should be retained and recovered in the products of the process. If it is desired to consider whether a coal is properly a gas coal, the first step will be to ascertain what proportion of its value is recovered in that form which is most valuable. Now 10,000 B.Th.U. are contained in about 18 cubic feet of gas, and in that form fetch about ¾d.; whereas 10,000 B.Th.U. are contained in about $\frac{11}{16}$ lb. of coke; and in that form fetch only about $\frac{3}{40}$d. Therefore, *cæteris paribus*, a coal would be the more valuable as a gas coal, the greater the proportion of its calorific value that can be recovered in the form of gas. According to the investigations made in the experimental gas-works of the German Association, this proportion varies in the gas coals examined between 90 and 30 per cent. The coke contains 50 to 65 per cent. of the calorific power of the coal; and the tar, from 5 to 8 per cent.

Generally speaking, coals yield more of their calorific power in the gas the more recent in origin they are—*i.e.*, the more nearly they approach flaming coals. But the quantity of coke diminishes at the same time. While the quantity and calorific power of the gas have to be primarily considered, the quantity and quality of other products play an important part. This applies in particular to the coke, since nearly two-thirds of the calorific power of the coal is retained in it. Hence a judgment of the coal according to the proportion of its calorific power which is found in the volatile products, must be modified by the results of tests of the quality of the coke. It is not so much the calorific power of the latter that matters as its mechanical qualities—such as its tendency to crumble, which affects its saleability for use as a fuel for household and industrial purposes and its fitness for being stored. Hence the range of gas coals is restricted on this side by the saleability of the coke.

There is no absolute measure of the strength of gas coke available. Many attempts have been made to obtain comparable figures by crushing tests in ordinary testing-machines; but they have failed owing to the want of uniformity of the material. At the experimental works of the Association a very simple method has been employed, which has answered well. The coke when cold is dropped from the charging-stage on to the concrete floor of the furnace basement, 11½ feet below; and it is then riddled and hand-screened to separate it into four sizes. The results were found by repeated tests of the same coke to be fairly uniform and reproducible. Generally speaking, the yield of large coke—*i.e.*, coke which does not pass through a screen with holes 2¼ inches in diameter—suffices to settle the value of the coke. For the coals examined at the experimental gas-works this yield varied between 70 and 30 per cent. Since the introduction of this method of testing, however, only Saar coals have been examined in large numbers; and the isolated examples of other classes of coals tested do not enable any general conclusion to be drawn in regard to the coke from these classes. The quality of the coke, and especially its hardness, is, however, undoubtedly a characteristic property of the particular coal; but all the conditions of

gasification have considerable effect on it. It is well known that rapid carbonization at a high heat improves the coke.

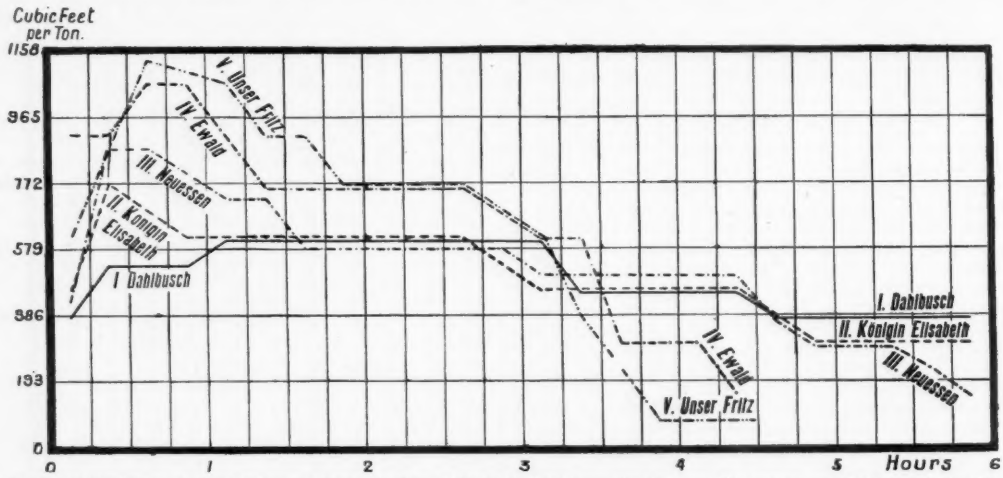
The influence of carbonization in completely filled vessels—as in vertical retorts and carbonizing chambers—is even more important. These conditions will be studied further at the experimental gas-works very shortly; and an experimental setting has been put at the disposal of the works for the purpose by the Dessau Vertical Retort Company, of Berlin. It may be anticipated that the range of gas coals will thus become extended so as to include flaming coals. Another matter of considerable influence on the strength of the coke produced is the size of the coal with which the retort is charged. Several trials demonstrated that the coke was stronger the smaller the coal. If the coal is in lumps the size of the fist or of an egg, the resultant coke is far less strong than if the coal is of the same description but quite small. Hence, in order to produce the strongest coke from a particular coal, the coal must be used in a very finely broken state.

A third essential property of the coal which affects its value, is the length of time required for its carbonization. The more slowly a coal carbonizes, the greater is the expense entailed in respect of carbonizing space and fuel. The annexed diagram shows the carbonization curves of a number of Ruhr coals which are in other respects of about the same value. The difference is very notable. While one coal is worked off in about 4½ hours, another requires 5½ to 6 hours. Broadly speaking, the older coals gasify most slowly, and the more recent coals most rapidly. The time required for carbonization is, however, also dependent to a considerable extent on the size of the coal. Lump or large coal is carbonized much more rapidly than small coal. As a consequence, the gas, being quickly liberated, is decomposed to a less extent, and is better. The yield of gas from very finely broken coal, even when thoroughly carbonized, generally falls short of that from large coal.

Turning again to the idea that carbonization is a process for enhancing the value of the coal, it is evident that the tar forms a considerable portion of the product of distillation, whether on the basis of quantity or of calorific power. It constitutes about 4 to 5 per cent. by weight of the coal, and contains 8 to 10 per cent. of the calorific power of the latter. Tar is an important product, on which, indeed, flourishing industries depend. The price of tar, however, to-day, as often in the past history of the gas industry, leaves much to be desired, and raises the question of whether it can be otherwise utilized. The tar has a calorific power about 10 per cent. above that of the ash-free coal substance or pure coal from which it was produced. When the price of tar has been low, there have always been attempts to utilize its calorific power by using it as a fuel in retort-settings or boilers, and thus economize coke. Recently tar-firing has in several places been successfully adopted, especially for boilers; and thus from the economical standpoint the tar has been converted into coke.

The repeated attempts to utilize tar for gas making have proved far less promising. Tar consists only to a small extent of constituents of the coal which are susceptible of decomposition, and for the most part of pyrogenous products, which have themselves been formed by heat. The first portion could still yield some gas, but the second could only be decomposed at a higher temperature than that at which it was formed. Practical trial confirms the conclusion thus drawn, that tar can only to a small extent be converted into gas.

In trials made at the experimental gas-works, the dehydrated tar was absorbed in completely carbonized coke breeze, and the mixture (1 part of tar to 2 parts of breeze) was carbonized for several days at a comparatively low temperature (about 1050° C.). The result was that one ton of tar, value about 18s., yielded 11,580 cubic feet of gas, or approximately the same quantity as a ton of coal of about the same value. The tar, however, yields no useful bye-products, and consequently the gas can be made more cheaply from coal. The calorific power of the gas from the tar was only about 470 B.Th.U. per cubic foot. Only about 15 per cent. of the calorific value of the tar is obtained in the gas,



The Course of Evolution of Gas during the Carbonization of Coals derived from the German Pits named on the Face of the Diagram.

which corresponds to scarcely 1 per cent. of the calorific value of the coal from which the tar was produced. The weight of coke was 62·7 per cent. of the weight of tar, corresponding to about 57 per cent. of the calorific power of the tar. The coke breeze was only quite loosely bound together; and the tar in no way rendered it more saleable or more useful than the original breeze. Particularly worthy of note is the fact that about 24 per cent. of the tar passed into the hydraulic main and works connections, and blocked them with a substance having the appearance of axle grease. It is evident, therefore, that no technically useful and economical conversion of tar into gas can be accomplished in this way.

Perhaps a better result could be obtained by utilizing the tar in a water-gas generator or super-heating it with steam at the temperature of the water-gas process. The quality, and consequently the value, of the tar produced depends above all on the method of carbonization, and only to a small extent on the description of coal carbonized. Hence in the valuation of coal, only the quantity of tar formed need in the first instance be taken into account. The difficulties the tar may cause in the working of the plant need not be considered in detail at this stage.

Finally, ammonia is a valuable bye-product of the distillation of coal. It results from the nitrogen of the coal; and it may be assumed that it is split off in distillation from the nitrogenous compounds contained in the coal as remains of the albumen of plants. The proportion of nitrogen in the pure coal substance varies in the coals examined at the Experimental Works between 1·2 and 1·9 per cent. Exceptionally, less than 1 per cent., or over 2 per cent., may be found. How this nitrogen becomes distributed among the several products of distillation—viz., coke, gas, ammonia, cyanogen, and tar—has, so far as the author is aware, only been investigated in small laboratory trials. Investigation on the large scale seems worth making, because the nitrogen is valuable only when it can be recovered as ammonia; and it would be useful to test whether any considerable part of the nitrogen occurs in a form which is susceptible of ready conversion into ammonia.

The destination of the nitrogen contained in the coal was investigated in the case of 17 coals; and the average of all the results showed that about 60 per cent. of the nitrogen remained in the coke, 20 per cent. was found as gaseous nitrogen in the gas, about 15 per cent. was converted into ammonia, and about 3 and 2 per cent. occurred as cyanogen and in the tar respectively. The difficulties attendant on this investigation were considerable, especially since the nitrogen in the gas amounts to only about 0·75 per cent. of its volume. That is a surprising fact, as in ordinary analyses of coal gas there is generally 3 to 5 per cent. of nitrogen reported. The investigations have demonstrated that no relation can be established between the yield of ammonia and the proportion of nitrogen in the coal, or the age of the latter. No type of coal has been found to afford an amount of ammonia which may be regarded as characteristic of it; and with each type the distribution of the nitrogen has varied greatly in different cases. There is always a large proportion left in the coke, which portion, however, can, it is well known, be partially converted into ammonia by means, for instance, of the passage of steam over the coke.

In conclusion the author would summarize the essential points by which the value of a gas coal should be assessed in the following statement: A coal is the more valuable, *cæteris paribus*, for gas making, the greater is the proportion of its calorific value which can be obtained in the gas produced from it. While the yield of calorific value in the gas generally increases as the coal is of more recent origin, the strength, and consequently the value, of the coke diminish at the same time. The quality of the coke and its strength are of considerable influence, as well as the calorific

valuation figure. A large proportion of ash in the coal not only reduces the yield of gas and the value of the coke, but is detrimental also in respect of the fuel consumption for heating the setting. The proportion of ash is, however, mainly dependent, not on the description of coal, but on the manner in which the coal is treated at the colliery, and hence the ash should be determined for each delivery. In assessing the economical value of a gas coal, regard must be paid not only to its special properties, but the working conditions of the particular gas-works, the state of the market, and other local circumstances must be weighed at the same time. The comparative figures obtained for the different gas coals at the experimental works of the Association afford, however, the necessary data from which the economical value of any one of these gas coals can be calculated for the case of any particular gas-works.

DEVELOPMENT IN GAS PURIFICATION.

By Dr. H. Wolffram, of Hamburg.

[A Paper read before the Meeting of the German Association.]

The great advances which have occurred during the last decade in the manufacture of gas, owing to the construction of vertical retort-settings and carbonizing chambers, and in the utilization of gas through the introduction of the inverted burner, high-pressure lamps, long distance supplies, small gas-engines, &c., make it of interest to inquire to what extent the purification of gas also has undergone continuous development from the earliest times up to recent years.

The original primitive wet treatment of gas with milk of lime very soon gave way to dry purification with slaked lime or with natural and artificial oxide of iron, oxides of other metals, or mixtures of lime and oxide, which, though they have undergone improvements and modifications, have survived all attacks up to the present. But almost as old as the dry process itself is the endeavour to displace it by a wet process, which should have more vigorous action in a smaller purifying space, and produce more valuable bye-products. For a short time there was, however, a reaction in the opposite sense, when ammonia recovery was effected in Munich by means of superphosphate; but the process never attained wide adoption.

An astonishingly large number of new processes for washing gas have appeared the last two decades; but only a few of them have so far secured a firm footing. Knublauch's wet process of cyanogen recovery, though unfortunately it did not become established, was followed by Bueb's process, which, on account of its simplicity, rapidly became extensively used, and had no fault except that, owing to the depression in the price of cyanide and the lower value of the ammonia which was recovered simultaneously, it failed to yield any direct profit. Feld revived Knublauch's idea of using lime and sulphate of iron, with considerable modifications, and carried out exhaustive investigations thereupon at the third gas-works at Hamburg, then just being brought into use. At first, however, satisfactory results were not obtained. Dr. Leybold and Dr. Schmidt perfected the process subsequently, and Herr Heynold, the Manager of the gas-works, improved it considerably from the technical standpoint. In particular, the lime and sulphate of iron are no longer run separately into the washer, but, contrary to Feld's view, are carefully mixed with one another first. The stoppages, which were very common at one time, have thereby been entirely avoided. At present, the process works in a perfectly trustworthy manner, and has already been in use satisfactorily also at the second gas-works at Hamburg for nearly a year. The naphthalene washing process of Dr. Bueb also, in which tar oil of high boiling point is used, has been extensively applied, and certainly ought to have a permanent value.

The process of Pippig and Trachmann for the extraction of carbon bisulphide could not, on account of its very high cost, secure any vogue; but the method of Dr. Mayer for the same purpose, by which the washing liquid is recoverable, appears to have better prospects of success. It is at the present time being tested in a small experimental washer at the No. 2 Gas-Works at Charlottenburg. Feld's numerous washing processes for the extraction of tar, ammonia, cyanogen, and sulphuretted hydrogen would effect a complete revolution in the mode of purification of gas. He has introduced for employment with them a special fast-running system of washer. The trials carried out in Hamburg two-and-a-half years ago with a small experimental apparatus, led to no positive result, however. On the other hand, trials of a most exhaustive character have been going on at Königsberg for over six years; and it may be hoped that, having regard to the great trouble and work involved in them, apart from the expense, they will ultimately have a successful conclusion.

The "direct" process for the recovery of sulphate of ammonia by treating gases with sulphuric acid, is only available for use in coke-oven works. Finally, however, there is Burkheiser's method of purification, with which trials have been in progress at the Grasbrook Gas-Works at Hamburg for nearly a year past. Dr. Krause, the Manager of these works, has already made a preliminary communication in regard to them to the last meeting of the District Gas Association of Lower Saxony. These trials—which will soon be completed, and will be repeated on a larger scale by the Berlin Corporation gas undertaking, have had quite satisfactory results. The most suitable apparatus for working the process has now to be devised and thoroughly tested. With gas containing from 920 to 1180 grains of sulphuretted hydrogen per 100 cubic feet, one cubic foot of bog iron ore prepared according to Burkheiser's patent process suffices to purify 20,000 cubic feet of gas. Normally the rate of flow of the gas is 6 inches to 8 inches, but experimentally it has been increased to 24 inches. The sulphuretted hydrogen was completely removed in a single apparatus; but by running two plants in series, 95 per cent. of the cyanogen contained in the gas was extracted from it. The salt obtained from the ammonia and sulphuretted hydrogen by the oxidation of the latter contains 25·5 per cent. of ammonia, and consists as a rule of about two-thirds of sulphate and one-third of sulphite of ammonia. If required, the latter third can also be oxidized to sulphate; but some fertilizing trials which have been made (and are being repeated on a larger scale at present) have demonstrated that the sulphite acts as a manure at least as well as the sulphate.

WASHING OF AMMONIA AND SULPHURETTED HYDROGEN FROM COAL GAS.

By Dr. Hurdelbrink, of Königsberg.

[Abstract Translation of a Paper read at the Meeting of the German Association.]

Coal gas is washed with a solution of ferrous sulphate until the liquid is about to cease to be ammoniacal, when it is removed. There are produced from the ferrous sulphate and the ammonia and sulphuretted hydrogen of the gas sulphate of ammonia and ferrous sulphide, thus—

(1) $$Fe\,SO_4 + 2NH_3 + H_2S = Fe\,S + (NH_4)_2\,SO_4$$

Sulphurous acid produced by the combustion of sulphur which is recovered in the course of the process is then passed in, and the ferrous sulphide and sulphurous acid combine to form ferrous tetrathionate, thus—

(2) $$Fe\,S + 3SO_2 = Fe\,S_4\,O_6$$

The solution is heated, whereby the ferrous tetrathionate is decomposed into ferrous sulphate, sulphur, and sulphurous acid, thus—

(3) $$Fe\,S_4\,O_6 = Fe\,SO_4 + 2SO_2 + S$$

The sulphur and sulphurous acid may be utilized again for the reaction that is shown in equation (2). The sulphur is recovered by filter-pressing from the product of equation (3), while similarly from equation (1) a filtrate is obtained which is a pure solution of sulphate of ammonia, free from iron, ferrous sulphide, and sulphur.

The author then proceeds to refer to the reactions of ammonium tetrathionate—viz.,

(1) On boiling with mercuric chloride, the reaction is—

$$(NH_4)_2\,S_4\,O_6 + Hg\,Cl_2 + 2\,H_2O = Hg\,S + 2\,HCl + H_2SO_4 + S + (NH_4)_2\,SO_4$$

Thus, one molecule of tetrathionate, containing two equivalents of ammonia yields two molecules of hydrochloric acid and one molecule of sulphuric acid. That is to say, there are two equivalents of acid per equivalent of ammonia.

(2) The tetrathionate reacts with bromine thus—

$$(NH_4)_2\,S_4\,O_6 + 14Br. + 7H_2O = (NH_4)_2\,SO_4 + 14HBr. + 3SO_3$$

That is to say, one molecule of tetrathionate consumes 14 atoms of bromine, forming 14 molecules of hydrobromic acid and 3 molecules of sulphuric acid, or a total of 20 equivalents of acid. There are therefore 10 equivalents of acid per equivalent of ammonia.

(3) Iodine does not react with tetrathionate.

The author next refers to the reactions of thiosulphate, thus, taking the sodium salt—

(1) The action of iodine on it is as follows:—

$$2\,Na_2\,S_2\,O_3 + 2\,I = Na_2\,SO_6 + 2\,NaI.$$

Therefore, one molecule of the thiosulphate combines with one molecule of iodine.

(2) Boiling it with mercuric chloride, will give the following reaction—

$$Na_2\,S_2\,O_3 + HgCl_2 + H_2O = Na_2\,SO_4 + HgS + 2\,HCl.$$

Thus, one molecule of thiosulphate yields two molecules of hydrochloric acid, or one equivalent of acid per equivalent of alkali.

Actually the formation of ferrous tetrathionate as an intermediate product of the reaction between ferrous sulphide and sulphur dioxide could not be proved, owing to the ease with which it breaks up. But the production of ammonium tetrathionate from sulphur dioxide and ammonium sulphide, and its decomposition into sulphur dioxide and ammonium sulphate, could be traced with certainty. The product of the reaction between sulphur dioxide and ammonium sulphide in aqueous solution in the cold was isolated by crystallization *in vacuo* over sulphuric acid, and the equivalents of reagents required by it corresponded, closely, according to the reactions already stated,

to the theoretical figures for the tetrathionate, and were at variance with the calculated figures for thiosulphate. The analytical figures are given in detail by the author. On boiling the pure concentrated aqueous solution of ammonium tetrathionate for a whole day, the amount of sulphur dioxide liberated corresponded closely to that required by the reaction—

$$(NH_4)_2S_4O_6 = (NH_4)_2SO_4 + SO_2 + 2S.$$

The theoretical quantities of separated sulphur and the sulphate of ammonia produced could not, however, be quite secured.

Washing trials were made in two washers of Feld's construction, working in series, with a regenerated lye (from equation (3)), containing about 2·8 lbs. of crystallized ferrous sulphate per gallon. The gas contained the following quantities of ammonia and sulphuretted hydrogen in grains per 100 cubic feet:—

—	Ammonia.			Sulphuretted Hydrogen.		
	Before the Washers.	After the Washers.	Extracted.	Before the Washers.	After the Washers	Extracted.
After 1 hour working	173·2	1·8	171·4	493·0	263·5	229·5
,, 2 ,, ,,	254·3	2·9	251·4	520·4	254·3	266·1
,, 3 ,, ,,	203·7	3·0	200·7	458·0	203·7	254·3
,, 4 ,, ,,	79·4	1·5	77·9	416·6	246·9	169·7

The liquid was at the end of this time becoming feebly alkaline. The quantity of gas passed through and washed per hour was about 46,000 cubic feet. The solution had been regenerated by treatment with air containing 6 per cent. by volume of sulphur dioxide.

The remainder of the paper is devoted to observations on methods of analysis suitable for the examination of the regenerated lye.

VALUATION OF COAL GAS ACCORDING TO ITS CALORIFIC POWER.

By Dr. Max Mayer, of Berlin.

[Abstract of a Paper Read at the Meeting of the German Association.]

The author has undertaken a long series of investigations with low-pressure incandescent gas-burners, of the ordinary Welsbach upturned type, with a view to testing the validity of M. St. Claire Deville's contention that the illuminating power of a mantle is proportional to the calorific power of the gas used. This contention, it will be recalled, had been put forward by M. St. Claire Deville in papers which he has presented at the last two sessions of the International Photometric Congress at Zürich. These papers, which contained details of an immense mass of experimental data on which their author based his view, were given in the form of lengthy abstract translations in the "Journal" (Vol. LXXXIII., pp. 499, 567, and 617, and Vol. XCIX., pp. 574, 625, 684, and 830). The conclusion arrived at in these papers was that the same expenditure of heat in the same incandescent burner produced the same illuminating power, even though the gas used was not the same. The author of the present communication has prepared gases of widely varying composition and calorific power, and has investigated with them in three different burners the validity of this conclusion.

The composition of a number of the gases used was determined by analysis, with results as recorded in Table I. The burners used were the ordinary Welsbach burner, and two burners having a smaller consumption, distinguished in the tabular statements of results as "A" and "B." The illuminating power obtained with a particular mantle was ascertained for a number of different gases, the rate of consumption of which was regulated so that the same amount of heat was applied in all cases in each set of experiments. The specific gravity of the gases was determined; and photographs were taken of the flames, and were shown at the meeting. The proportion of air required for the combustion of each gas, and the amount of primary air drawn in by the burner, were ascertained by analysis in each case.

It will be seen from Table I. that, when the net calorific power of the gas falls within the limits 480 to 585 B.Th.U. per cubic foot at 60° Fahr., 30 inches bar., and saturated, M. St. Claire Deville's proposition is supported by the results of these experiments with the low-pressure incandescent burner. On the other hand, it will be seen that the gases of lower calorific power, used in experiments Nos. IV., V., and VIII., display a higher efficiency in use. It might have been supposed, and indeed it has hitherto been assumed, that the higher efficiency was to be ascribed to the smaller proportion of air required for the combustion of the poorer gases, as at the same gas pressure a greater percentage of primary air would then be drawn into the burner. The results recorded in Table I. show, however, that this assumption is not well founded. The superior efficiency obtained with gases of low calorific power is due, as a comparison of the figures given in Tables I. and II. show, to their chemical composition. They contain a considerably higher percentage of hydrogen than the richer gases. The rich gases, containing more heavy hydrocarbons, as used in Experiments VI. and VII., show a lower duty, probably because of the smaller intensity of the combustion of these hydrocarbons.

Analogous conclusions may be drawn from the results of the experiments made with the burners having a smaller gas consumption, as recorded in Tables III. and IV.

Table I.—*Composition of the Gases Used (Volumes per Cent).*

—	Coal Gas.	Oil Gas.	Experiment No. VI. Oil Gas and Coal Gas. Proportions 1 to 8.	Experiment No. VII. Oil Gas and Coal Gas. Proportions 1 to 17.	Experiment No. VIII. Oil Gas and Hydrogen. Proportions 1 to 9.
Carbonic acid . .	2·4	0·1	2·1	2·3	—
Heavy hydrocarbons	2·5	21·5	4·6	3·6	2·1
Oxygen	0·5	0·8	0·5	0·5	0·1
Carbonic oxide . .	12·6	0·9	11·3	12·0	0·1
Hydrogen . . .	52·2	24·0	49·0	51·0	92·4
Methane	26·8	46·0	29·0	28·0	4·6
Ethane	—	3·2	0·4	0·2	0·3
Nitrogen	3·0	3·5	3·1	2·4	0·4
	100·0	100·0	100·0	100·0	100·0

Table II.—*Welsbach Upturned Burner.*

Experiment No.	Gas Used.	Net Calorific Power B.Th.U. per C. Ft. at 60° F. 30 ins. Saturated.	Heat Expended per Hour B.Th.U.	Gas Consumption C. Ft. (60° F. 30 ins. Saturated) per Hour.	Candles.	Volumes of Air Required for Combustion of One Volume of Gas.	Percentage of Air Drawn In.	Specific Gravity of Gas.	Percentage of Hydrogen in the Gas.
I.	Coal gas	480	2182	4·54	77	4·8	54	0·413	52
II.	Coal gas carburetted with benzol	584	,,	3·74	72	5·6	58	0·490	
III.	do.	540	,,	4·03	76	5·3	62	0·473	
IV.	Coal gas diluted with hydrogen 2 : 3	367	,,	5·93	79	3·4	50	0·237	80
V.	do. 1 : 4 . . .	326	,,	6·69	82	3·0	41	0·185	90
				Newer Mantles.					
VI.	Oil gas with coal gas 1 : 8.	562	2262	4·03	68	5·6	50	0·446	49
VII.	do. 1 : 17 . .	516	,,	4·37	70	5·2	44	0·442	51
VIII.	Oil gas with hydrogen 1 : 9	343	,,	6·61	88	3·8	37	0·198	92
VIII a.	Coal gas	479	,,	4·71	76½				52

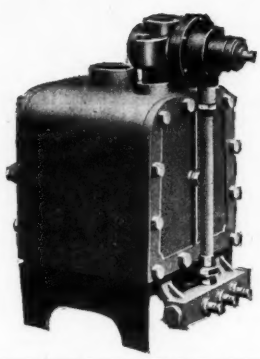
Table III.—*Small Upturned Welsbach Burner A.*

Experiment No.	Gas Used.	Net Calorific Power B.Th.U. per C.Ft. at 60° F. 30 ins. Saturated.	Heat Expended per Hour B.Th.U.	Gas Consumption C.Ft. (60° F. 30 ins. Saturated) per Hour.	Candles.	Volumes of Air Required for Combustion of One Volume of Gas.	Percentage of Air Drawn In.	Specific Gravity of Gas.	Percentage of Hydrogen in the Gas.
IX.	Coal gas	480	1468	3·04	67	4·8	56	0·407	52
X.	Coal gas carburetted with benzol	562	,,	2·62	63	5·4	60	0·454	
XI.	Coal gas carburetted with benzol and hydrogen 3 : 7	411	,,	3·57	67½	3·7	56	0·253	*circa* ·80
XII.	Oil gas and coal gas 1 : 8.	549	,,	2·70	59	5·8	54	0·447	49

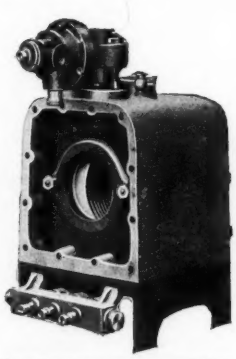
Table IV.—*Small Burner B.*

Experiment No.	Gas Used.	Net Calorific Power B.Th.U. per C.Ft. at 60° F. 30 ins. Saturated.	Heat Expended per Hour B.Th.U.	Gas Consumption C Ft. (60° F. 30 ins. Saturated) per Hour.	Candles.	Volumes of Air Required for Combustion of One Volume of Gas.	Percentage of Air Drawn In.	Specific Gravity of Gas.	Percentage of Hydrogen in the Gas.
XIII.	Coal gas.	490	1507	3·08	65	4·8	56	0·412	52
XIV.	Coal gas carburetted with benzol.	569	,,	2·66	62	4·9	67	0·476	
XV.	Coal gas carburetted with benzol and hydrogen 3 : 7	390	,,	3·88	67	2·9	62	0·246	*circa* ·80
XVI.	Oil gas and coal gas 1 : 8.	558	,,	2·70	59	5·4	59	0·452	

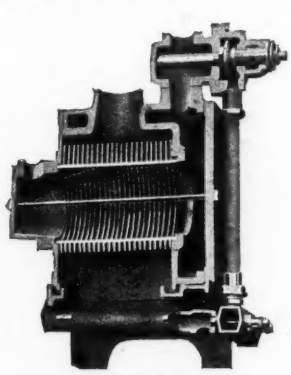
Davis's 'Gilled' Circulator



THE 'GILLED' CIRCULATOR.
¶ Note how Compact it is.



SHOWING INSPECTION PLATE REMOVED.
¶ Note how Accessible it is.



IN SECTION.
¶ Note how Simple it is.

Solves your maintenance problems, and provides a new field of practically limitless extent for the sale of Gas.

UNUSUAL STRENGTH characterises the construction of the 'Gilled' Circulator. Iron and steel—and the best of that—are the only materials used. Continual use, hard water, rough handling, cannot affect the 'Gilled.' Owing to its extreme ACCESSIBILITY—already treated at some length in these pages—it welcomes conditions which, to a fragile Circulator, would mean early and certain disaster.

The Patent Gilled Tube with which we dealt in detail last week is a guarantee of HIGH EFFICIENCY.

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PLEASE SEND FOR OUR LATEST LISTS.

We have these Lamps working in our Show-Rooms, and should be pleased to demonstrate same to you if you would favour us with a visit.

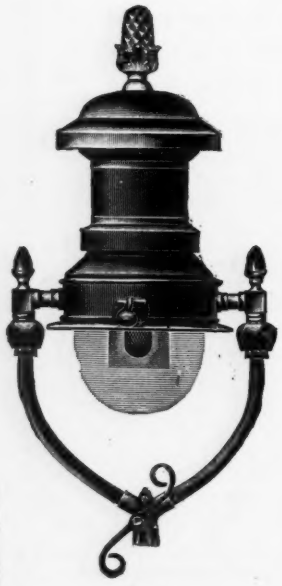


Fig. 1.
Showing new pattern 1-lt. Lamp with Top Cap on.

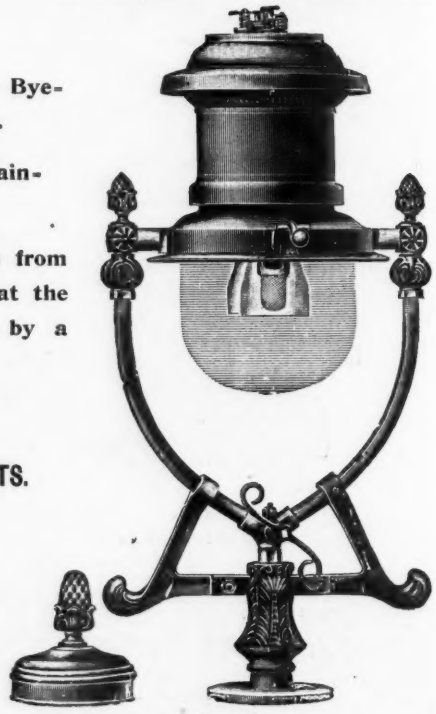


Fig. 2.
Showing new pattern 2-lt. Lamp with Top Cap removed for regulating purposes.

J. & W. B. SMITH, GAS LIGHTING SPECIALISTS, 17-23, Farringdon Road, London, E.C.

INSTRUCTIONAL AND EXPERIMENTAL GAS-WORKS OF THE GERMAN ASSOCIATION.

REPORT OF THE COMMITTEE.

The systematic work on German gas coals which was referred to in the report of the Committee last year [see "JOURNAL," Vol. CVII., p. 41] was continued in the same manner as before; so that now exhaustive investigations have been made on 28 descriptions of coal, in addition to the 52 varieties from the more important German coalfields which had previously been dealt with, and a tolerably complete picture of the character of the more important descriptions of coal available for gas manufacture in Germany has thus been obtained. The larger proportion of the coals examined were from the Rhenish Westphalian coalfields. Last year a fairly comprehensive report on these German gas coals, and the chief results of their examination, was presented to the meeting at Frankfort-on-Maine; and this report has been since distributed to all contributors to the funds of the works and to a large number of works and persons interested in the matter. As a result of the interest raised by this report, numerous questions have been directed to the staff of the experimental works, and have been dealt with by them. The works have also been requested to undertake the investigation of coals before purchase by gas-works; and in many instances have carried out such investigations, for which there will evidently be an increasing demand in the future, having regard to the fact that the range of coals now applicable for gas manufacture has been greatly enlarged through the conditions which now prevail in the industry. The less onerous requirements in the quality of the gas and the employment of new types of setting have considerably extended the choice of coals for gas making. The methods of investigation have been further perfected with a view to obtaining more exact results for comparative purposes. The examination of the coals now extends to testing the strength of the coke produced, the yield of ammonia, or the distribution of the nitrogen in the coal among the products, and the influence of the size of the lumps of coal carbonized on its behaviour during distillation.

In addition to German coals, a large number of descriptions of English coal are used in German gas-works, especially on the northern coasts of the country, though in the neighbourhood of the waterways their use extends far into the south. A circular was addressed to a large number of gas-works to ascertain the descriptions of coal used, and small samples were readily sent by the managements of the works. These samples were subjected to chemical and calorimetric examination, such as had been applied in the first instance to the German gas coals with a view to examining the particular and more important properties of the English coals in use as a preliminary to a testing on the larger scale in the experimental plant. Later, a number of gas-works supplied larger quantities of the more important English coals which come on the German market; and investigations on these have already been commenced. The results obtained in the chemical investigation so far have been collected in a pamphlet which was issued to the meeting at Königsberg. A summary of these results, with a few introductory remarks, is given at the conclusion of this report.

Studies were made, in the course of the systematic testing of gas coals, of the distribution of the ammonia produced in the different parts of the experimental plant, on the evolution of sulphur compounds during the distillation, on the proportion of free to combined ammonia in the gas and gas liquor, and on the variation in the strength of the coke with varying conditions. Having regard to the fairly long period during which the experimental works have been making their investigations, it may be said that the methods of examination, after undergoing numerous improvements, are now established on a fairly settled plan of procedure. It is therefore contemplated compiling a comprehensive report on all the investigations so far made at the works, and, further, to issue from time to time reports on the later work in so far as it is of general interest or of value to members of the Association. In addition to the systematic investigation of gas coals, tests and analyses were made of a large number of raw materials, products, and substances in use on gas-works, including coke, tar, liquor, sulphate of ammonia, cyanogen sludge, oxide of iron, and other purifying materials, and paints for gasholders. A number of gas-lamps of various constructions both for low-pressure and high-pressure gas, and of the upturned and inverted forms, were investigated as well. Also apparatus for the measurement and governing of gas supplies, automatic gas analysis apparatus for furnaces, and other analytical apparatus were tested in the course of the year.

The wide interest taken in the works is shown by the large extent to which it is now being used for such testings and investigations, as well as by gifts for the improvement of its equipment. Dr. E. Blum, the Managing Director of the Berlin-Anhalt Engineering Company, on the occasion of the Redtenbacher celebration at the Technical College at Carlsruhe, presented a sum of £150 to the works for the provision of apparatus for exact photometrical work. The firm of S. Elster, of Berlin, have also presented an experimental gasholder of about 50 cubic feet capacity, which will prove of the greatest service in the investigations. Dr. Strache, of Vienna, has presented the works with one of his new gas calorimeters. Gifts of apparatus have also been received from the German Welsbach Incandescent Company and from other firms. The Syndicate of Pipe Makers also presented the works with all the requisite pipes and bends for the connections required in the extension of the works' plant. Gas-heating apparatus for the smaller rooms of the buildings were presented by three different firms.

During the year, the staff of the works have carried out a large number of efficiency trials and tests to control working of plant in outside gas-works; and many such further investigations are under consideration. For instance, the works examined the setting of 18 vertical retorts at the Mariendorf works, in Berlin, of the Imperial Continental Gas Association; and the results have already been reported in the "JOURNAL" (see Vol. CIX., p. 27). A large efficiency trial has also been carried out of a setting of inclined retorts at the gas-works of St. Gall, erected according to designs drawn up on that works. In several gas-works smaller investigations were made by the staff of the experimental works, many of which have proved most instructive. In the area covered by the Central Rhine District Gas Association, 14 gas-works were visited, and more or less exhaustive investigations made of works' plant. While such investigations in many cases presented considerable difficulties, and the results were not forthwith so great as was sometimes hoped for, it must not be forgotten that the personal contact of members of the staff of the experimental works with the officials of gas-works and with working on the practical scale cannot but result in benefit to both parties.

In regard to instruction, ten gas engineers have taken part in the operations of the experimental works, after having been qualified by a two-terms' training at the Technical College at Carlsruhe in the scientific principles of gas manufacture and in laboratory work. A fourteen-day course of instruction in the spring was attended by 38 students, who had the opportunity of becoming acquainted with the plant of the experimental works, and the methods of testing used on gas-works and in photometrical investigations. The two retorts on the works, after two-and-a-half years' uninterrupted working, developed cracks; and the interior of the setting had to be renewed. The retorts would have served for a longer period for the ordinary operations of a gas-works; but in order that the results obtained might be free from any doubt, the retorts were changed last autumn. A rotary gas-washer was installed; and new connections were put in on the works to admit of the order of working of the condensing and washing plant being varied as desired. The capacity of the hydraulic main was reduced by filling up its lower part with cement, in order that the tar should flow off more quickly, so that in changing from the testing of one coal to another there would be less mixing of the two tars.

The total number of samples or matters dealt with in the year was 1122; but having regard to the long time required for carrying out many of the investigations, the mere statement of numbers affords no indication of the amount of work performed. The statement of receipts and expenditure for the works covers a period of a year-and-a-quarter. The report states that the past year has been a most satisfactory one so far as the working and affairs of the experimental works are concerned. Tribute is paid to the active co-operation of the members of the staff and of outside helpers. It is pointed out with satisfaction that somewhat similar provision to that of the Association's experimental works has been made in England at the University of Leeds, through the establishment of the Livesey Professorship, and in Austria by the experimental works for gas and fuel established at the Technical College at Vienna. For some years past, also, the Swiss Association of Gas and Water Engineers have been carrying out good work in the same direction at their experimental works at Zürich.

The report is signed by Herr F. Reichard and Professor H. Bunte, who control the works, which are under the superintendence of Dr. K. Bunte. A paper by the latter gentleman, on "Information about Gas Coals," was presented to the meeting as a sequel to the report, and a translation of it is given on p. 957.

CHEMICAL COMPOSITION AND CALORIFIC POWER OF ENGLISH GAS COALS.

A paper supplementary to the foregoing report, and referred to in it, deals with the chemical composition and calorific power of English gas coals as used on German gas-works. The introduction states that, as large quantities of English gas coals are carbonized on many German gas-works, it seemed desirable to extend the investigations already made of the chief varieties of German gas coals to those English coals which come on to the German market for use on gas-works.

Small samples were first supplied by a number of gas-works using such coals; and a chemical examination was made of them, with a view to determining their individual characteristic properties. The analytical results obtained are recorded according to the names under which the coals were sold; but further investigation will be necessary to show whether the coals examined were really representative of their trade descriptions. The investigations so far make no pretence to completeness. In fact, many more samples have recently been received, and are under examination just now. The preliminary testing in the chemical

laboratory will be followed as in the case of the investigations of German gas coals by carbonization trials on a large scale. A number of gas-works have already supplied 10-ton samples to the works; and the trials are in hand.

The analytical results so far obtained are summarized in the appended tables.

TABLE I.—*Composition of the Coals as Received.*

Description of Coal, and Gas-Works from which the Sample was Received.	Moisture (by drying at 110° C.).	Ash.	Combustible Portion or Coal Substance.
	Per Cent.	Per Cent	Per Cent.
Londonderry (Graudenz)	1·88	9·42	88·70
,, (Bromberg)	1·61	8·21	90·18
Lambton (Stettin)	1·43	8·81	89·76
,, (Stuttgart)	1·80	6·11	92·09
Deans Primrose (Harburg)	1·52	9·58	88·90
,, (Bremen II.)	1·15	12·45	86·40
Wearmouth (Wismar i. M.)	1·31	5·90	92·79
,, (Wiesbaden)	1·60	8·12	90·28
,, (Harburg)	1·86	10·85	87·29
New Leversons (Memel)	1·51	10·13	88·36
,, (Stralsund)	1·20	9·78	89·02
,, (Königsberg i. Pr.)	1·51	8·27	90·12
Leversons Wallsend (Kiel)	1·05	12·68	86·27
,, (Schönebeck a. E.)	0·96	8·47	90·57
,, (Frankfort on Oder)	1·23	10·16	88·61
Old Pelton Main (Lübeck)	1·02	6·45	92·53
Ravensworth Pelaw (Wismar i. M.)	1·14	9·96	88·90
Silkstone, John Lockes (Schönebeck a. E.)	4·26	11·17	84·57
,, P. u. P. Universal (Stassfurt)	2·85	6·74	90·41
Thorncliffe (Flensburg)	1·65	7·35	91·00
Kineil (Bremen)	1·91	9·10	88·99

TABLE II.

Chemical Composition of the Coal Substance of English Gas Coals.

Description.	Coal Substance.							
	Composition. Per Cent.					Coke. Per Cent.	Volatile Matter. Per Cent.	Calorific Power B.Th.U. Per Lb.
	C	H	O	N	S			
Durham Coals.								
Londonderry	84·48	5·49	6·14	1·99	1·90	69·15	30·85	14,600
Londonderry	84·72	5·34	5·99	1·97	1 98	69·58	30·42	14,609
Lambton	84·99	5·38	6·05	1·92	1·66	69·36	30·64	14,567
Lambton	84·97	5·44	6·37	1·94	1·28	67·48	32 52	14,600
Deans Primrose	85·43	5·44	5·08	1·92	2·13	69·54	30·46	14,729
Deans Primrose	85·61	5·43	5·45	1·98	1·53	72·10	27·90	14,706
Wearmouth	85·10	5·06	6·37	1·95	1·52	69·53	30·47	14,558
Wearmouth	85·19	5·24	5·96	2·00	1·61	70·49	29·51	14,665
Wearmouth	85·57	5·32	5·57	1·96	1·58	70·60	29·40	14,596
New Leversons	85·77	5·31	5·19	2·04	1·69	70·76	29·24	14,814
New Leversons	85·24	5·27	5·95	2·04	1·50	70·87	29·13	14,666
New Leversons	86·33	5·20	5·03	1·99	1·45	71·99	28·01	14,812
Leversons Wallsend	85·21	5·38	5·88	1·97	1·56	71 13	28·87	14,636
Leversons Wallsend	86·37	5·31	4 98	1·93	1·41	71·96	28·04	14,881
Leversons Wallsend	86·25	5·44	4·95	1·96	1·40	72·00	28·00	14,814
Old Pelton Main	86·73	5·23	4·88	1·84	1·32	71·86	28·14	14,940
Ravensworth Pelaw	85·02	5·17	5·98	1·92	1·91	72·12	27·88	14,672
Yorkshire Coals.								
Silkstone, John Lockes	83·59	5·31	7·53	2·09	1·48	66·38	33·62	14,216
Silkstone P. u. P. Universal	83·66	5·48	7·00	1·96	1·90	66·39	33·61	14,438
Thorncliffe unscreened	83·88	5·33	6·57	1·97	2·25	67·77	32·23	14,580
Scotch Coal.								
Kineil	84·45	5·55	7·05	1·88	1·07	66·95	33 05	14,330

MANCHESTER JUNIOR ASSOCIATION.

Visit to the Preston Gas-Works.

The members of the Manchester and District Junior Gas Association who availed themselves of the arrangements made by the Council for an inspection of the works of the Preston Gas Company on Saturday, had an instructive, if somewhat laborious, time. The visit was looked forward to with peculiar interest for a variety of reasons. To begin with, the Preston Gas Company are just now engaged in the completion of an extension of plant at the principal manufacturing station, involving an expenditure of about £17,000; and the Engineer, Mr. S. Tagg, has had a close and active connection with the Manchester Junior Association. Then, again, members of the party were reminded of the part Preston played in the early days of the gas industry, and of the inventive genius of the late Mr. Henry Green, who for so many years held the position as Engineer to the Preston Gas Company.

It was in 1815 that the Preston Gas Company was founded, and it has the distinction of being the first provincial company formed for the supply of gas for public lighting. It is on record that the Preston Parish Church and the Fulwood Barracks were the first institutions of their respective kinds in this country to be lighted by gas. At the present time, the Company have three manufacturing stations—Avenham Street, Walker Street, and Moor Lane, with gasholder stations at Ribbleton, Walker Street, and Walton, and central offices in Fishergate, which rank among the most ornamental buildings in the town. The Avenham Street works were the first put down by the Company, and they have been enlarged from time to time, until to-day they are easily capable of manufacturing three-quarters of a million cubic feet of gas per day. The retorts are direct fired, and the primary mains of the dry type. The remainder of the plant does not call for mention in detail. There are, however, three styles of holders—namely, framed, spiral-guided, and wire-rope guided. At these works are the blacksmiths', joiners', wheelwrights', fitting, and meter-repairing shops; the headquarters of the gas-fitters and main and service workers being also here. Since the introduction of the carburetted water-gas plant at the Moor Lane works in 1895, the Walker Street works have not been utilized for manufacturing purposes. The old retort-house, which is 173 feet long and 54 feet wide, has been cleared of its settings, and a steel joist and concrete floor erected at a convenient height from the ground. When completed, this building will be used to accommodate the whole of the artizans employed by the Company; the ground floor being set apart for them, and the upper floor for stores of all descriptions.

The greater part of the time of the visitors on Saturday was spent at the Moor Lane works, where important extensions and alterations are now being carried out under the direction of Mr. Tagg. The party, which numbered about fifty, were met by Mr. Tagg and his Assistant, Mr. W. L. Heald, under whose guidance an exhaustive inspection was made of the new works and plant being put down by Messrs. Robert Dempster and Sons, of Elland. Before the present alterations were commenced, these works were capable of producing about one-and-a-quarter million cubic feet of coal gas and some one-and-a-half million cubic feet of carburetted water gas. The old settings are of the generator type, originally from the designs of Mr. Charles Carpenter. There is one furnace to two through arches; the furnace itself being a notable feature. The primary mains are dry. The condensers, exhausters, washers, and scrubbers are of the ordinary type; while the purifiers are the original "Green's," six in all—two being 90 ft. by 35 ft. by 5 ft. 3 in. deep, and four 35 ft. by 30 ft. by 5 ft. 3 in. deep. The travel of the gas being from the top to the bottom is claimed to be a special advantage. Oxide only is used; and the cast-iron pieces fixed round each cover are the late Mr. Green's idea for testing the rubber joint with water for leakage. Adjacent to the purifiers are housed two station-meters. The carburetted water-gas plant has condensers, scrubbers, exhausters, and meter of its own. The coal and water gas meet at the inlet to the purifiers. The sulphate of ammonia plant is of original design. The liquor, after passing through the superheaters, enters the rectangular trough, through the interior of which is a 3-inch steam-pipe without any perforations. Lime joins the liquor at the outlet of this trough, and the whole enters a circular still, which is 1 ft. 7 in. deep only. Three circular compartments cause the liquid to pass from the outer to the inner ring; steam being blown into each compartment by means of the radial arms, which are constantly rotating. The second still is similar to the first. The saturator is of copper. It was explained that the plant will easily make 2 tons of excellent salt per day. Sixteen hours are allowed for drainage.

The alteration to the carbonizing plant consists of the erection of fourteen through arches of six retorts each, fittings, floors, coke conveyor, elevator, and screening plant, coal breaking, elevating, and conveying plant, two chimneys, and a Fiddes-Aldridge retort-charger. The bench is 134 feet long; the pier-walls being 9 ft. 3 in. centres. Thirteen generators are on the Klönne system, and one is of the Dempster-Brookes type, put in for experimental purposes. The retorts are 24 in. by 16 in. by 22 ft. long, six in each arch, in three tiers. The floors are of concrete and expanded metal. It was pointed out that the new floor, being about 6 feet below the old one, has the advantage that the coal hopper and conveyor are larger than usual; no part approaching the tie-bars of the roof. The chimneys are 4 ft. by 2 ft. 6 in. inside by 70 ft. high; each chimney dealing with seven retort-beds. A noticeable feature of the bench fittings is the primary main. Liquor will be in the main to a depth of 3 inches from the top of the inverted dip-pipe; a cast-iron bonnet 5½ inches deep being dropped over the pipe end to seal off the retort. The two 8-inch governors are of ordinary type; and the tar-towers have had to be built up as they are by force of circumstances. The De Brouwer coke conveyor delivers on to a tray elevator, and this on to a jigging conveyor, which can drop coke into either of the receiving hoppers. Under each hopper are a breaker and jigging screens giving four sizes of coke. The capacity of the storage hopper is 200 tons. A locomotive crane on the gantry places any excess coke into stock, and also supplies the coal plant out of the adjacent stores of coal when necessary. The coal plant will deal with the necessary coal during eight hours. From the receiving hopper, of a capacity of 35 tons, the coal passes on to a shaker feed, and thence to a jigging screen, and into the breaker. The elevator is of the single chain type; and the push-plate conveyor has a single chain. The hoppers will hold 200 tons; and the 84 retorts will deal with 150 tons per 24 hours.

In the carrying out of the alterations and extensions, the existing walls, excavations, heights, and widths have been utilized. The cost has been kept down, too, by the use of the old girders, and the preparation of practically all the plans in the drawing

offices of the Company. It is hoped to have the new plant in working order for the coming winter; and Mr. Tagg, to use his own words, is aiming at achieving a record of being able to carbonize at 9d. or thereabouts.

At the conclusion of the inspection of the works, the party proceeded to the Fishergate offices, where, by the invitation of the Directors, "High Tea" was partaken of. The meeting held subsequently was presided over by Mr. James Taylor, Past-President of the Association, in the unavoidable absence of Mr. F. Thorp, the President.

Mr. TAYLOR expressed the pleasure it had given the party to visit a works engineered by one of their own members, and said the occasion had been rendered more particularly interesting through their being able to inspect the new plant which the Company were having put down. The Directors and Engineer were to be complimented on their selection of plant; and he was sure when the work was completed the results obtained would be admirable. He had been particularly interested in the hydraulic main, which was, he believed, Mr. Tagg's own invention; and he would look forward to the results obtained from it.

Mr. A. L. HOLTON, Vice-President, in moving a vote of thanks to the Directors for their hospitality, and to Mr. Tagg and his staff for their services in showing the party over the works, said the visit and inspection had been of great interest.

Mr. J. TOWNSLEY seconded the motion—observing that both Mr. Tagg and Mr. Heald were known to them more as men of deeds than of words.

Mr. TAYLOR, in putting the resolution, said the fact that, though the Manchester Junior Gas Association was started only some six years ago, about thirty of the members were now holding senior positions, must reflect greatly to the credit of the Association and its work. Mr. Tagg's work was well known to them before he went to Preston; and they were certain the Company would materially benefit by his services.

The motion was carried with acclamation.

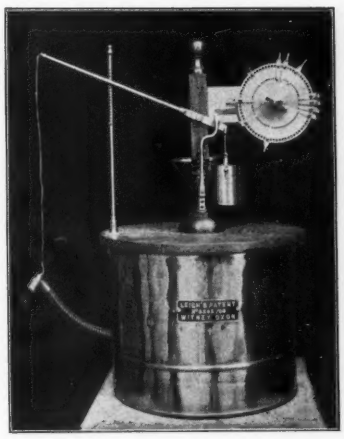
Mr. TAGG, responding, said he would be pleased to convey to his Directors the members' thanks for the hospitality extended to them. As soon as the Board knew that the members were to visit Preston, they expressed their earnest desire that the party should be properly looked after; and he was pleased to think that the arrangements made had met with appreciation. As to the Junior Association, he was satisfied it was doing a very useful work indeed—providing facilities for the members not available by the ordinary avenues. The Association encouraged the spirit and desire for extended knowledge and study which, in his opinion, was invaluable to the industry at large. The Junior Associations generally were undoubtedly doing very good work; and he would always be glad to do anything in his power to extend their usefulness. In this connection, a thought occurred to him. Would it not be possible for the Council of the Association to institute something in the way of improving upon these visits by inviting members to contribute at the following meeting (say) a written or spoken description of anything that had particularly interested them at the works inspected? There was just the danger of the visits and inspections growing into picnics—a pleasant round. It was his opinion that everyone joining such parties should go prepared for active thought, and inspect what there was to see in a practical spirit. Of course, it would be impossible for them to grasp the whole thing; but they might at the next meeting deal with something seen, which was of special interest to them. It should result in useful little discussions. He was obliged for the thanks extended to him and to Mr. Heald for showing the party round the works. In this connection, he desired to acknowledge the help he was receiving in carrying out the alterations and extensions at the works from his staff—specially mentioning Mr. Heald to Mr. Lowther Nicholson.

Mr. HEALD also responded, as did also Mr. F. J. NEWBOUND, the Secretary to the Company.

LEIGH'S AUTOMATIC PRESSURE CHANGER FOR STATION GOVERNORS.

In the "JOURNAL" for Feb. 15, p. 442, an illustrated abstract appeared of a patent specification (No. 5242 of 1909) filed by Mr. Francis Leigh, of Witney, Oxon; and the apparatus, manufactured for the patentee by a first-class firm of brass founders and engineers, is now finding its way into every-day use on gas-works. One of the pressure changers has been fitted at the Kenilworth Gas-Works, and another at Witney.

Those who read the patent abstract above referred to will remember that the apparatus consists of a copper tank (to be mounted on the governor), into which a stream of water, regulated by a tap, is continuously falling. The outlet is near the bottom of the tank, and consists of a short length of copper pipe, with a piece of flexible metallic tube fixed to it; and it is by the mechanical raising or lowering of the free end of this tube that the weight and depth of water in the tank are controlled. The free end of the tube is connected to a lever, working easily on a steel bearing; the lever being fixed so that five-sixths of its length is on one side of the bearing and one-sixth on the other—thus securing an intensified movement when the short portion of it is moved. A counterbalance weight is hung from the short end in such a manner that the long end, together with the flexible tube it supports, is slightly the heavier, and will remain at the lowest position at which it is allowed to fall, and if raised will fall again as soon as the raising force is removed. The lever is raised by tappets fixed on a dial, which is rotated by clockwork once every 24 hours. The tappets are of different lengths, so that they disengage themselves from the lever at different positions as it is raised. Thus the lever may be raised only a small portion of its full range by one tappet, or it may be raised its full range by a longer tappet. After the lever has been raised its required distance, it is caused to remain in this position (until it is released) by a catch, which, working on a hinge, is pulled by a weight working on a pulley over the lever, and engages one of a number of notches in the catch. The tap fixed in the overflow pipe is used for regulating the amount of water which can be discharged in a given time after the lever is lowered, and is used (in conjunction with the inlet tap running a continuous stream into the tank) in such a manner as to ensure a gradual reduction of pressure. The lever is guided and kept in its position by rising and falling against a guide-rod fixed near the centre of its length; the rod being drilled at frequent intervals so that a pin may be inserted at any point to prevent the lever falling below that point. This is in case it is necessary to temporarily prevent the minimum pressure being applied without interfering with the dial or tappets. The usual lowest position of the lever is arranged for by inserting a pin at the correct position through the guide-rod on which the lever rests when released and allowed to fall.



Leigh's Apparatus.

In order to meet the requirements of those whose water supply might fail, the patentee has brought out a device for ringing an alarm bell immediately this happens. The simple and compact apparatus is complete in itself, and may be fixed to the pressure changer in a few minutes. One of the features of the changer is that it may be hand operated at any time, to meet exceptional demands, without interfering with the clock or tappets. Another feature is that a machine made for (say) an 8-inch governor could be altered to suit a 10-inch or a 12-inch governor—a larger tank being the only change necessary.

Removing Sulphur from Gas.

Last week's American mail brought an interesting letter from Mr. Frederic Egner, who writes from Portland, Oregon, and in the course of his communication gives some information with regard to a process which he has seen in successful operation on quite a large scale at the gas-works there. "This process," he says, "takes practically the last trace of sulphur out of illuminating gas by reheating it to about 1200° Fahr., and then again passing this gas through an auxiliary set of oxide purifiers. The reheating results in converting the sulphur present in ordinary purified gas into removable sulphur compounds. Is that all? you may ask. No; it is not. By means of this process, coals and oils now unsuitable for the manufacture of gas, by reason of containing too much sulphur, can be employed in gas making as well as the non-sulphurous material, which, on account of this, is sold at a much greater price than the low-grade coal and oil. In this way, while the reheating and second purification of the gas costs here about 1 c. per 1000 cubic feet in addition to the primary cost of manufacture, they are able to use raw material which costs less by 5 c. or more per 1000 cubic feet of gas made, and produces gas which does not contain as many grains of sulphur per 1000 cubic feet of gas as the most stringent regulations ever imposed upon a gas company permitted. I would like to go into greater detail; but if any one of your readers is sufficiently interested, I dare say the desired information can be had from parties who are actually concerned with the process."

Miss Agnes Armitage, the younger daughter of Mr. Charles Armitage, the Engineer and Manager of the Lancaster Corporation Gas-Works, was married on Wednesday last to Mr. Fred. Bleasdale, of Lancaster. Mr. Cecil R. Armitage, the Manager of the Morecambe Gas-Works, was "best man."

Among the Birthday Honours, His Majesty has been pleased to confer a Baronetcy of the United Kingdom upon Mr. Alfred Mond, M.P., who is a Director of Brunner, Mond, and Co. and the South Staffordshire Mond-Gas (Power and Heating) Company, and Chairman of the Power Gas Corporation.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Mr. Reid and the Gas Institution Proceedings.

SIR,—In the portion of your "Review of Proceedings" at the annual meeting of the Institution of Gas Engineers which deals with the discussion on Mr. Ward's paper on "Management of Small Gas Undertakings and Works," and under what is as near an approach to a "scare" heading as the columns of the "JOURNAL" would permit—"One Objector, but General Approval"—I was surprised to find that my contribution to the discussion appeared to your reviewer as a "terrible denunciation" of the paper and the Council. Fearing I know not what, I turned to your report of the discussion, and was relieved to find I had not after all been guilty of any grave indiscretion such as your review indicated.

On the contrary, I would appear to have congratulated Mr. Ward and the Council on the part they jointly took in the production of such a paper before the Institution. My words were not intended to convey any other meaning; and I cannot therefore understand the view of them taken by your reviewer. Any adverse criticism was directed against the non-inclusion in the paper of much that would have afforded scope for a better discussion, and which omission I was not aware at the time was due to the curtailment of the paper at the wish of the Council.

I do not think any of those present (including Mr. Ward) considered that my remarks were in any way denunciatory, as I had nothing but praise for the results obtained by the writer of the paper.

I consider, therefore, that the portion of the review in question is incorrect; and not justified by the facts as given in your own report of the discussion. One can almost trace a little resentment in the review, whether due to the manner of my criticism or the geographical source from which it is alleged the "terrible denunciation" came, is not clear.

T. J. REID.

Ballina, June 24, 1910.

The Discussion of Mr. Shoubridge's Paper.

SIR,—On reading the report of the discussion on the paper I submitted to the Institution last week, I notice Mr. Allen made an error in his calculation to arrive at the cost of our carbonizing wages.

Instead of doubling the charge of 1·17d.—the cost of handling a ton of coke—he should have divided this by two; seeing it takes two tons of coal to produce one ton of coke, less the quantity used for fuel.

As the mistake does an injustice to the conveyor, I shall be glad if you will allow this correction to appear in your next issue.

SYDNEY Y. SHOUBRIDGE.

Lower Sydenham, June 22, 1910.

SIR,—My attention has been called to an error made in my remarks on Mr. Shoubridge's excellent paper, and which does an injustice to the coke-conveyor.

Instead of doubling the figure given as the cost of handling one ton of coke (1·17d.), it should have been halved, to represent the cost per ton of coal. It would appear, therefore, that with the D.B. conveyor, the costs of labour and materials, per ton of coal carbonized, were 0·585d. and 1·34d. respectively. These figures represent very satisfactory working. On the other hand, the figure of 8¼d. per ton of coal, given as the cost of all labour from coal in the breakers to coke in stock, must be reduced by 0·585d., to find the cost of carbonizing inside the retort-house, which leaves 7·665d. This is higher than the figure given by me, and not so creditable to the D.B. machines (stoking).

I regret the error, inadvertently made in the haste of the moment.

EDWARD ALLEN.

Liverpool, June 22, 1910.

Logarithms and Tables for Chemists.

SIR,—While out on my holiday, I have received a copy of the "JOURNAL" containing a well-thought-out review of my "A B C Five-Figure Logarithms and Tables for Chemists."

In reference to the important point of saturated gases, to which your reviewer calls my attention, I would point out that while a factor might be used, the more convenient plan for reduction to 60° Fahr. and 30 inches mercurial pressure for a saturated gas would be to find the equivalent of 60° Fahr. as 15·5° C. and of 30 inches as 762 mm. Deducting from 762 the aqueous vapour tension for 15·5—viz., 13·2 mm.—we have the partial pressure of 748 8, the log. for which and temperature 15·5 is given, in Table IV., as 3·06668. Naturally those requiring this constant would substitute the co-log. 2·93332 to be used instead of 2·90285.

I will certainly refer to this point in the next edition of the book.

C. J. WOODWARD.

Birmingham, June 25, 1910.

The Coalite Process.

SIR,—I very much regret to see that a misleading paragraph on the subject of "Coalite," which was unfortunately inserted in the "Journal of the Royal Society of Arts" of June 10, has been copied into the "JOURNAL OF GAS LIGHTING" of the 21st inst.

Immediately I read the paragraph, which had unfortunately been inserted without my seeing it, I expressed to the Coalite Company my extreme regret that a statement of this sort should have appeared in the Society's "Journal." I am informed, on the best authority, that the statement is based on entirely inaccurate information; and without entering into the legal question as to whether it is really libellous or not, I have not the slightest hesitation in saying that the paragraph is of a character which certainly ought not to have appeared in the Society's "Journal," and that I am anxious to prevent any further mischief which may arise from its having appeared.

I shall be grateful if you can publish this letter in your next number.

H. T. WOOD, Secretary,
Royal Society of Arts.

John Street, Adelphi, W.C., June 27, 1910.

PARLIAMENTARY INTELLIGENCE.

STANDARD BURNER BILLS.

Second Reading of Nos. 1 and 2 Bills in the House of Commons.

The Gas Companies (Standard Burner) (No. 1) Bill came before the House of Commons last Thursday, when the motion was made and the question put that the Bill be read a second time.

Mr. R. D. HOLT said that some of those who were opposing the Bill had been very much dissatisfied with the method of procedure adopted by the promoters. They felt that the grouping together of different companies in one Bill did not give the opponents a fair opportunity of putting their view before the Committee. He was glad to say, however, so far as he was concerned, that they had been able to come to an arrangement with the promoters under which they were ready to accept an instruction to the Committee in the following terms: "That it be an instruction to the Committee on the Bill that they do hear the case of the promoters, the Liverpool United Gas Company, separately, and do, on the request of any of the petitioners, consider the expediency of dividing the Bill in order to remove any difficulty that may, in their opinion, be proved to exist (by reason of the inclusion of several cases in the Bill) in the submission separately of any of the cases in opposition." He could give very excellent reasons to prove that the case of the Liverpool Gas Company was on quite a different footing from the other companies in the Bill; but since the matter had been arranged in the way he had indicated, it was not necessary for him to take up the time of the House.

Mr. RYLAND ADKINS, on behalf of the promoters of the Bill, desired to say that their object in grouping a considerable number of companies together was merely to save the time of Parliament and the expenditure of public money. They frankly and promptly accepted the suggestion that they should form not one Bill, but three, and an instruction to the Committee, in the names of Sir Daniel Goddard (the Member for Ipswich) and himself, to consider whether in any case there ought or ought not to be separate and special treatment. He fully agreed with the further suggestion of Mr. Holt. If, under these circumstances, the House was prepared to assent to the second reading, and his honourable friend moved his instruction, he (the speaker) would ask leave to move the adjournment of the debate, in order that an amended instruction might be moved, providing that there should of necessity be a separate Bill for Liverpool, and that any other place might have separate treatment if they could satisfy the Committee that there were grounds for it. In this form he hoped the instruction would recommend itself to the House. He was sure it would be agreed that there were aspects of this highly technical question which were common to a large number of authorities. In this case, one decision might be most economical and at the same time proper; while, on the other hand, in the case of Liverpool there were exceptional circumstances which he cordially agreed justified the suggestion that had been made. As to any other local authority, if they could satisfy the Committee that their case was in any way special, the instruction, if agreed to, would secure that that local authority should have special treatment. This having been agreed to by the promoters in conference with his honourable friend and other members, he hoped the House would agree to the second reading in accordance with the almost universal rule of sending to Committees upstairs, Bills dealing with technical matters requiring an attention which the House would not perhaps be willing or specially adapted to give.

Colonel SANDYS said he would be sorry to oppose the motion; but although he was glad to hear that special treatment had been accorded to Liverpool, there were other places, notably a borough in his own constituency, very deeply interested. He understood that the more usual proceeding in a case of this kind was that each borough or city interested should promote a separate measure dealing with the question on its merits, or else should seek to obtain a Provisional Order. The advantage of this procedure was that very often a conference took place between the petitioners seeking certain advantages such as the promoters of these Bills, and the cities or boroughs affected by the clauses of which they disapproved. There was a broad, general principle involved. It was extremely difficult for the House to pass any measure applicable to all the circumstances of individual portions of the country, although the general principles of the measure approved on the second reading might be in themselves most excellent. Under these circumstances, a portion of his constituency took exception to many of the technical points in the three Bills, notably that their time would be largely wasted in attending the Committee. While all the provisions of the separate Bills relating to the different companies were gone into, he opposed the second reading; and he asked the House to allow the usual procedure, under which the parties concerned obtained separate Bills or Provisional Orders.

Mr. G. R. THORNE (Wolverhampton) said that he found himself in a somewhat difficult position. The course taken by Mr. Holt had come upon him as a surprise, because he understood that Mr. Holt, in common with others who had petitioned against the Bill, was going to oppose it. This course was entirely new, and involved considerable difficulty. If the result in the case of Wolverhampton were to be what it already was in the case of Liverpool, he could understand the position. It would be like an individual Bill which would be individually opposed. But other cities and towns, so far as he could understand, were not to have the same privilege as Liverpool. Liverpool was to be treated as a distinct place at once; but other places were to go through the expense of appearing before the Committee, and waiting possibly many days in hearing the various discussions. If this were the case, it meant considerable expense to the Corporation he represented. If the result of the proposal were that Wolverhampton had to put forward its case in the same way as if the Company promoted an individual Bill, he could not offer the slightest opposition; but if it meant that they had first to prove that they had special claims, and afterwards go to the expense of urging these special claims, it seemed to him that they had

to incur double expense, and were placed in a very difficult position indeed. Unless these difficulties were overcome, he saw no alternative, on behalf of the interests which he represented, and according to the views which had been represented to him, than to oppose a second reading. He took it that others who were similarly situated as himself would be compelled to adopt the same course. But he did not understand why other towns had not been approached in the same way as Liverpool had been, to see whether it was possible to make equal terms. He did not in the slightest degree wish to offer factious opposition to the Bill—what he did was purely in the public interests. Unless he could be satisfied on the point of expense, he was bound, in justice to his constituents, to oppose the second reading.

The SPEAKER having pointed out that Wolverhampton was not included in the Bill at all,

Mr. THORNE said he would wait till the third Bill was produced.

Mr. PERCY ILLINGWORTH then proceeded to inform the House why the Board of Trade thought that Liverpool should be given preferential treatment, and should be regarded as a case by itself. Liverpool was differentiated in this case, in so far as their supply was of 20-candle power, which was the highest supplied by any company or any town in the United Kingdom. The rest of the towns, authorities, and gas companies all, he believed, supplied gas of from 14 to 16 candle power. Their circumstances were on all-fours; and it was considered desirable to group all the cases together. He held no brief for one side or the other. In these matters, the Board of Trade took up an attitude of benevolent neutrality; but it should be said, in justice to the promoters of the Bill, that they did in the first instance approach the Speaker's Counsel, who told them that it would be perfectly competent for them to introduce all these undertakings and companies under one Bill, but that it would be more agreeable and more easy to group the different cases in separate Bills. And this was done, not with any desire to prejudice any local authority, but with a view of saving expense. He did not see that in any way the representatives of the local authorities were prejudiced, because they might place before the Committee reasons which would induce them to give separate treatment. He asked the House to read the Bill a second time, and let the instruction go forward to extend the same treatment to the second and third Bills, and at the same time accept the instruction which was down in the name of Sir Daniel Goddard.

Mr. H. S. FOSTER said that he had been specially requested by the Lowestoft Corporation to oppose the second reading of the Bill. In doing so, he voiced the view expressed at a conference of the local authorities dealing with all three Bills, not upon the ground of injury to any particular locality, but on the broad principle that, in the first place, 43 different companies had combined together in the three Bills. The companies were very differently circumstanced, both with regard to the conditions of supply and to the prices, testing-places, methods of testing, standards of illuminating power, and other matters. They had totally different areas of supply; and it was almost impossible—and this was the view of the local authority—for any authority to deal separately in a joint promotion of this character with the various circumstances of the companies supplying within its jurisdiction. Any particular local authority, whether interested in these particular Bills or not, was likely to be prejudiced in the future in the case of legislation, whether it be by gas companies, railway companies, or others, who might adopt a similar procedure in promoting Bills in Parliament if the precedent set by these Bills was allowed to be established. The main object is to enable these companies to adopt a new form of burner which would have the effect of reducing the illuminating power and of increasing the cost—notably to the poor, who were much larger users than they used to be of gas for heating and other purposes. He did not think it was seriously denied by the promoters that this would be one of the direct effects of the Bill if granted. They pleaded that they were limited by Act of Parliament to a maximum—he believed that was the only answer—and that they were bound to reduce the cost to the consumer. Therefore they said that what the consumer lost in one way by the loss of illuminating power he would regain in another way by the reduced cost of his gas. This was no answer. In the first place, there was no guarantee that the amount which the consumer would continue to pay on a reduced bill would be equivalent to the reduced article that he was consuming at the increased price, and, in the second place, they all knew there was a limit to dividend beyond which the reduction had to be made. It was quite possible that it was conducive almost to extravagant depreciation and other charges, which would not go into the pockets of the consumer and which would increase the cost. He was told the cost of the new burner was something like two guineas; and it therefore would be beyond the powers certainly of the poor for purposes of testing. The circumstances under which the Bill had been brought in, the powers it proposed to give, and the difficulties in which every local authority would be placed if it was to seek *locus standi* to appear before the Committee, gave, he ventured to hope, sufficient ground as to why the Bill should not get a second reading.

Mr. J. F. L. BRUNNER said that, if the House did not accept the second reading, they would be stopping progress. The three Bills proposed to substitute for an antique instrument the most modern form of testing gas. The Hon. Member who had just spoken seemed to think that poor consumers would have to purchase the burners. But this was not the case; it was the gas companies. He thought the public had been enabled by the progress of science to improve upon the burners used by gas companies heretofore; and provided the gas was good, the burners were better than they used to be. Therefore, if the gas was kept to a certain standard, it was better to-day than originally. In the Metropolitan area, more than half the gas used was for heating and power; and therefore gas of the lower illuminating standard was just as good for the majority of users as gas of the higher standard. So much was this so, that the Committees upstairs had allowed gas companies to lower their standard. The Welsbach burner, as a matter of fact, which was practically universal, was better if used with poor gas than with rich. Therefore, this Bill would enable the companies to give cheaper gas; and if the gas was well burned, it would be better for the public than the dear gas. He was in no way interested in gas companies, but he hoped the House would not insist upon an antiquated instrument instead of a more modern one.

On a division, the "Ayes" were 80; and the "Noes," 61.

The No. 2 Bill.

In the case of this Bill also, the motion was that it be read a second time.

Sir CLEMENT HILL said the Corporation of Shrewsbury objected to the No. 2 burner because they considered it a disadvantage to the gas consumers. Their Act of 1901 provided that Sugg's No. 1 burner should be used to test the gas; but the Bill proposed to alter that. If this was necessary, if it was altered to the Company's advantage, the sliding-scale should be altered too. It was also considered that no efficient method was provided in the Bill as to the heating value of the gas. Strong objection was also felt to the general principle of an omnibus Bill for these various companies. It was desirable that each borough should have an opportunity of presenting its own Bill, so that its own particular circumstances and conditions might be brought before the House.

Mr. ADKINS remarked that, so far as the borough of Shrewsbury was concerned, the points mentioned by the Hon. Member could be dealt with in the ordinary way before the Committee. There was nothing in the grouping of the Bills in the second group to prevent the particular case of Shrewsbury being put before the Committee—a thing which was done very often in cases of this kind. If the second reading of the Bill were rejected, they would have the extraordinary position that whereas these Bills were brought into the House with a large number of opponents, a very large proportion of them had now withdrawn. The Committee had decided that there was no adequate reason for dealing with each Bill separately. The course he would suggest by no means precluded the possibility or certainty of dealing with any particular argument. When the Bills came there, those who were anxious to have the business done in a way fair to the local authorities and gas companies put down an instruction which would enable those representing the borough of Shrewsbury—if they could show that the special interest of the borough was distinct and separate, and ought to have special consideration apart from the general one—to put their case. With reference to the remarks of the Hon. Member for Wolverhampton, he did not think it was an accurate forecast to say that this proposal would impose special expenditure either upon the borough of Shrewsbury or upon Wolverhampton, because, if they thought they could prove that their case was really special in essence and distinct from the others, they could conduct their opposition as in a Special Bill. The object of these Bills was not to injure the poor, as was inaccurately stated by one Hon. Member. The object was merely to get an accurate measurement of the quality of the gas; and it was in the interests of the community, quite as much as in the interests of any company, that they should have precision and accuracy in any tests applied to gas. Under the uniform practice of both Houses of Parliament for years past, no fresh company or municipality had been allowed to sell gas without the provision of the standard burner. The object of the Bill was to extend universally what Parliament had extended invariably to all new applications. The House would see that what was aimed at was not to benefit gas companies at the expense of the public, nor to benefit the public at the expense of legitimate and lawful undertakings, but to clear up the matter and see that there should be as good a test in the interests of the public and the undertakers in all parts of the country as there were now in many parts of the country. The instruction they had put down and the view taken by Mr. Illingworth would, he hoped, satisfy the House that they were endeavouring to save cost and time where the issue was common, and to allow special treatment where the circumstances were special. It was the object of the Bill to make uniform the very best test of gas, so that companies might not waste money nor the public get an article which was improperly tested. Under these circumstances, he hoped the second reading would be given, and that the other questions bristling with technicalities should be decided by a Committee upstairs.

Sir C. HUNTER said his objections were very similar to those made by Sir Clement Hill. It appeared to him that if the Bill became law it would be quite possible for a gas company to reduce their illuminating power by 25 per cent., which would be much more to the benefit of the company than the consumer. His constituents also thought that the cost of changing the burner should be provided by the gas companies and not by the consumers. The Bath Corporation considered—and he thought rightly—that if the Bill became law the testing instruments should be undoubtedly under the control of the municipality, and also that any expense of altering the system should be borne by the gas companies. An enormous amount of gas was used for heating purposes; and it was possible the calorific power might be reduced.

Sir DANIEL F. GODDARD thought there was a great deal of misconception as to the whole meaning of the Bill. The speeches which had been made were really full of inaccuracies. Mr. H. S. Foster had seemed to think that this was going to be particularly hard on the poor. A more ridiculous theory was never put forth. Supposing the operation of the new test-burner was to the advantage of the gas companies, how was that going to be charged upon the consumer? If a company could save money, it could reduce the price of gas; and surely everybody knew that the course of recent legislation was to put gas companies on the sliding-scale standard—that before they could obtain the slightest extra profit from any advantages in the cost of manufacture, they had to give the larger proportion of the profits to the public. Thus, if the cost of gas was reduced by 1d. per 1000 cubic feet, all that would go to the shareholders by way of extra profit would be ¼ per cent.; the whole of the rest would go to the public. If the cost of gas were reduced, by far the greater portion of the saving went to the consumers. Sir C. Hunter seemed to think that by the adoption of the Bill a gas company would be able to reduce the illuminating power of their gas by 25 per cent.

Sir C. HUNTER: I say they might.

Sir DANIEL GODDARD said that was quite impossible. He would frankly admit, as an expert on test-burners, that this was an improvement on the old standard, and would give a better illuminating power to gas; but the only saving he ever heard named was something like a candle or a candle-and-a-half illuminating power. The candle power of the gas in an up-to-date city like Bath would not be less than 15, and a reduction of 1½ candles could never be interpreted as 25 per cent. It was quite a misconception to imagine that the cost of the burner would be charged to the consumer. If they studied Acts of

Parliament, they would find that the apparatus for testing gas had to be provided at the cost of the gas company. The local authority would be put to no extra expense in regard to the matter. It was laid down by the Gas Referees that the gas companies were entitled to have their gas tested by a burner which would be the most suitable for obtaining the greatest amount of light. This was the principle on which they were going; and this was why they were insisting upon the No. 2 argand. The companies had grouped themselves together with the object of getting a common factor; and it would be clear to those representing the working classes in Parliament that it was not in the interests of members to impose legislation which would be of a most costly description. It should be always their aim to reduce the cost of Private Bill legislation. If, instead of putting these Bills into three groups, every one of the companies had to come to Parliament for powers, it would be an enormous cost to them individually. Who was going to pay that cost? The gas company might not care to undertake the expenditure of promoting the Bill. There might be differences of opinion and of circumstances; but by the instruction on the paper it would be perfectly possible to remove the difficulty. He hoped, with the instruction in view, the Bill would be allowed to go to second reading.

Mr. H. S. Foster said he had been faced with a charge of inaccuracy with reference to his statement that the tendency of the Bill would be to increase the cost of gas. Sir Daniel Goddard had admitted quite frankly that the effect of testing the gas with the No. 1 argand had been to give better results. He was told that practically the effect of the burner, as compared with the No. 1 argand, was to show that, when the gas was tested, it was of better quality when tested by a No. 2 —the comparison varying about 2 candles in 15-candle gas, and a considerably higher increased ratio in the lower-grade gas. He was told that in the case of Liverpool it was decided to allow a reduction to the extent of 6 or 7 candle power; and therefore Sir C. Hunter would see that the difference might amount to 20 per cent. He was told that the practical effect of adopting the burner would be to enable gas companies to sell gas of considerably lower value for illuminating, heating, and motor purposes than they were at present allowed to do under their Acts. It was obvious that, if the companies were to be permitted to supply gas of lower power than was required by Act of Parliament, it would necessitate having a greater number of cubic feet, and therefore the user would consume a larger quantity.

Sir Daniel Goddard asked whether the Hon. Member had read the evidence given before the Committee of the House of Lords, in which it was conclusively shown that there might be a trifling loss of calorific power.

Mr. H. S. Foster said he had not done so. But he was told that they got better results from the No. 2 burner than from the No. 1. He was informed, however, from a source upon which he thought he could rely, that the effect of the use of the new burner was to decrease the calorific power in regard to the lower and poorer quality of gas; and the effect of this would be obviously to increase the price of gas to the poor, because they would have to use a larger amount to get the same calorific results.

Mr. James Parker said he had just an elementary knowledge of the testing of gas; and he did not think that some of the things which had been stated in the debate on the side of the promoters could be borne out in fact. He opposed the Bill, not from any factious opposition, but because he believed that it would be a disadvantage to the very poorest class of the community. If he did not think so, he would not go into the lobby to vote against the Bill. The very poorest class of the community did not buy incandescent burners. They had to be satisfied with the ordinary burner; and therefore this measure would be a distinct disadvantage to them. It was a well-known fact that in many gas-works, owned both by companies and corporations, the engineer tried to get the best production results he could, and endeavoured to save as much money as possible in regard to the purification of gas. For the purposes of the poor in regard to heat, he admitted it did not make a great amount of difference; but for the purposes of light, in the cases where gas was used without incandescent mantles, it made a great deal of difference to the poor if they did not make use of mantles. But there was another difference, to his mind, which was of equal importance to the poor who burnt gas, and who had not the advantage of the invention, and that was that they usually lived in the smallest rooms; and if the gas was foul and not purified, these people were breathing much more poisonous air. He contended, therefore, that there was a case which could be made on the other side. He did not think that the House had been properly informed with regard to this particular Bill. As to the promotion and amalgamation of the Bills, he agreed entirely with the promoters, because if anything could be done to decrease the cost of promoting Private Bills, or to decrease the cost of opposition to them, he considered it ought to be done. On the other hand, he thought there was really a case to be made out—a genuine case on behalf of the poor; and they were going to suffer unless they took advantage of the incandescent burner and of the latest inventions in order to get from bad gas the same illuminating power that they could get without incandescent burners from good gas. The companies admitted that this was going to be an advantage to them; and that it was all right, because they could not have more than a certain dividend under their Act of Parliament. But their capital could go up in value, and there would be other advantages which were not represented in dividends. He thought these measures a disadvantage to the poor; and he would vote against the Bill.

Sir Fortescue Flannery said that if he thought the Bill was going to be a disadvantage to the poor, he would certainly vote against it; but as he happened to have some experience in connection with gas, he did not believe that the measure would be a disadvantage to them. The first point which the House ought to remember was the existence of the sliding-scale in practically every relationship existing throughout the country between the producers and sellers and the consumers of gas. The position was that before there could be greater profits there must be a lowering of the price of gas; but the sliding-scale provided that before a greater distribution of profits—before a greater dividend was possible to any company—the price at which the gas was sold must be lowered. Some years ago, the illuminating power of gas was obtained by what was known as the flat-flame burner; but now they had the incandescent burner. They must therefore have gas which produced, not the first effect of a direct illuminant, but the new necessity of heat; and therefore the best illuminant was obtained now by gas which produced the greatest amount of heat. The old conditions were changed. The effect generally of having gas which of necessity was the production of heat rather than the production of light, was that the same quality of gas which was the best for producing heat through mantles was best also for producing heat for cooking purposes. Therefore, a gas company could not produce gas which was capable of the double use, and which was beneficial to the poor because it was cheaper (having had eliminated from it all those constituent parts of direct illumination which used to add to its cost; and so gas could now be produced mainly for the one purpose of heating, and so could be produced cheaper. At Wandsworth, gas was down to 1s. 10d. per 1000 cubic feet—something like half the price that it was within a very few years. The result, therefore, of this change in the constituent qualities of gas and the method of manufacture had been universally, among gas-works of considerable size, to reduce the cost of the gas itself; and this was one of great benefit, as the enormous extension of cooking by gas-heating stoves proved, to the poorest of the poor. Poor people who could not put their names down for quarterly payments in the ordinary way, and who had adopted the penny-in-the-slot system, were benefited beyond comprehension by the system, which had enabled the price of gas to be reduced, and had brought it within the reach of people who a very few years ago could not possibly use it. With regard to the flat-flame burner, it followed, from what he had said, that the increased calorific power of the gas reduced the direct illuminating power of it. He admitted that if they were to pay the same price per cubic foot of gas of modern manufacture, they would not get the same amount of illuminant for the money, whether they were rich or poor, as they would under the old system. But they did not pay the same they used to pay. If they compared the illuminating power, even the reduced illuminating power of modern gas burned in the flat-flame burner, against the cost of it in money, having regard to the reduced cost per 1000 cubic feet, they would find that the poor person was no worse off than before the change took place. He claimed that he had demonstrated that this was a matter in which the interest of the consumer and of the producer were indissolubly united. He claimed also he had proved that for cooking purposes the poor were benefited by the change that had taken place in the system of manufacture—a change that would be assisted by the adoption of the new burner. He claimed that, as regards illumination from the point of view of money expended, the poorest people were no worse off than they were before this new system.

Mr. G. R. Thorne said it seemed to him that, as a result of this procedure, a lower-power gas would be given to the people, and that the poorer classes of the population, who would not be able to use this particular burner, would necessarily suffer, and any reduction in the cost would not be sufficient to compensate them. If it was right that this burner should be the standard, it ought to be the regular standard all round. It should be standardized—not by a Bill brought forward by private companies in their own interests, but by a General Bill produced in the public interest. It might ease the companies combined together to do it more cheaply; but the opposition was certainly not eased to the individual corporation. It seemed to him that this was not a fair way of dealing with a public question.

Mr. Illingworth said he believed it was the common practice in the House, in the case of such a Bill as this, unless it traversed some accepted principle, to give it a second reading. He thought there was still considerable misapprehension as to what was the object of the Bill. Gas companies must have a standard burner; and so far back as 1868 it was laid down that the test-burner should be the most suitable for obtaining from the gas the greatest amount of light. There were several burners now in use for officially testing the illuminating power of the gas supplied by the various companies under the powers which had been given to them. The object of this Bill and of the other Bills was the adoption of the No. 2 argand burner, which was recently invented, and which satisfied the requirements of a test-burner. He reminded the House that the burner had been approved by the Gas Referees; and it was generally used, as recommended, so as to get a uniform standard test for all gas. This test-burner had been in use by the London Gas Companies since 1905; and it was provided for in all modern Gas Acts and Orders as a matter of course. The Board of Trade point of view was that they desired, in the place of the various test-burners now in use, to get the one recommended by their own scientific Committee in order to obtain an absolute standard of uniformity of gas in all parts of the country, so that one might be compared against another in the interests of economy and the usefulness of the article produced. He hoped the House would agree to the safeguard the instruction would give to any authority in the conditions which were laid down, and that the Bill would be given a second reading.

On the question being put that the Bill be read a second time, the "Ayes" were 96; and the "Noes," 56.

Sir Daniel F. Goddard then moved: "That it be an instruction to the Committee on the Bill that they do, on the request of any of the petitioners, consider the expediency of dividing the Bill in order to remove any difficulty that may, in their opinion, be proved to exist (by reason of the inclusion of several cases in the Bill) in the submission separately of any of the cases in opposition." Continuing, he said that the Liverpool Bill not being in this Bill, he thought it only fair that, if the companies concerned could show that there were circumstances which would make it desirable for them to separate themselves, the Committee should have power to do so.

Mr. Ryland Adkins seconded the motion; and it was agreed to.

The No. 3 Bill.

On Friday it was announced that the opposition to this Bill was withdrawn. It was read a second time without debate; and a similar instruction—moved by Sir Daniel F. Goddard—was passed permitting the Committee on the Bill, on the request of any of the petitioners, to consider the expediency of dividing the Bill.

BRIGHTON AND HOVE GAS BILL.

THE QUESTION OF A CAPITAL REDEMPTION FUND.

House of Lords Committee.—Friday, June 24.

(*Before the Duke of* BEDFORD, *in the Chair, the Marquis of* BRISTOL, *the Earl of* WESTMORELAND, *Lord* BASING, *and Lord* DIGBY.)

Consideration of this Bill, which proposes to confer further powers on the Brighton and Hove General Gas Company, was commenced last Friday.

The promoters were represented by Mr. BALFOUR BROWNE, K.C., Mr. HONORATUS LLOYD, K.C., and Mr. CLEASE; the Hove Corporation by Mr. RAM, K.C.; the Brighton Corporation by Mr. TALBOT, K.C.; and the County Councils of East and West Sussex by the Hon. E. CHARTERIS.

Mr. BALFOUR BROWNE, in opening the case for the Bill, explained that the Company was incorporated in 1839, and had had various Acts of Parliament extending the limits of supply from time to time—the last Act being obtained in 1893. The objects of the Bill were to incorporate certain facilities which had been conferred on gas companies in the last fifteen years since they were in Parliament. Most of the clauses were those of the Model Bill; and there was no real opposition to the preamble. The whole question before the Committee was on two clauses which brought the Company into line with the modern practice of the House. As there was no opposition on the preamble, he would, with the permission of the Committee, take it that the preamble was proved and proceed with the clauses on which opposition arose.

Mr. RAM indicated that his case for Hove would be identical with that of Brighton.

Mr. TALBOT then proceeded with his objections to clause 12 of the Bill, which provides as follows:—

12.—Whereas under the provisions of sections 50 and 51 of the Brighton and Hove Gas Act, 1881, the Company were required to cease to manufacture gas or residual products at the Black Rock works of the Company or after a period of 10 years at any place within the parish of Hove, and have accordingly abandoned such works and ceased to manufacture at their then existing works in the parish of Hove, and in consequence thereof capital to the extent of £57,000 or thereabouts of capital expended in the works so abandoned has become unproductive, and it is expedient that the Company should cancel such unproductive capital, it is hereby provided as follows:

(1) The Directors of the Company may, if they think fit, in any half year appropriate out of the revenue of the Company as part of the expenditure on revenue account any sum not exceeding £1800 to a fund to be called the "Capital Redemption Fund."

(2) Every sum credited to the fund shall be applied by the Directors from time to time, and in each case as soon as is reasonably practicable after such sum has been credited, to the fund under the provisions of this section in purchasing ordinary or preference stock of the Company; and all stock so purchased shall immediately after the purchase thereof be cancelled, and shall thenceforth be and be taken to be extinguished; and the Directors shall cause the same to be duly noted as so cancelled and extinguished in the books of the Company: Provided always that all stock so purchased otherwise than in the open market shall be purchased at a price not exceeding the middle price of the then current official quotation for the same on the London Stock Exchange or at the price (as recorded in the Company's books) at which the last transaction in the same class of stock has taken place whichever of these prices shall be the lower.

(3) This section shall cease to operate so soon as the Company shall have purchased and cancelled under the provisions of this section ordinary or preference stock of the Company of the aggregate nominal value of £57,000.

(4) The Company shall not re-issue any stock which shall have been cancelled under the provisions of this section.

Counsel went on to say there was no precedent whatever for the clause. The Corporation had not the least objection to the shareholders of the Company redeeming or cancelling the capital which had not been represented for a great many years by any works used by them in the manufacture of gas. But the Corporation objected to the Company doing so at the expense of the consumer, at least for the next nineteen or twenty years. The immediate effect of the proposal would be to withdraw £3600 per annum from the divisible profits to which, under the sliding-scale, the consumer looked for a reduction in the price of gas. In the particular circumstances of the Brighton Company, it was common ground between them that the consumers' proportion of any revenue was about five-sixths to the shareholders' one-sixth. Under this proposal, the consumer would lose about five-sixths of the £57,000. After a time, the saving of the dividend which would otherwise have to be paid on this capital which it was proposed to wipe out would balance the charge on the redemption fund; but inasmuch as the annual saving would be about £170, it would be at least nineteen years before that equilibrium was attained. There was no question that the proposal would benefit the shareholders at once, and increase the value of their security immediately it was carried into effect; and there was equally no doubt that it must be at the expense of the consumer, at least for nineteen years. Even if it were proved that at the end of this time the future generation would benefit substantially, it was obvious that the shareholders were a much less fluctuating body than the consumers. The Corporation asked that the £57,000 should be provided by the shareholders and should not affect the sliding-scale.

Evidence was first given in support of the opposition to the clause by the Borough Accountant (Mr. Stevens), who said that the effect of the clause so far as the consumers were concerned would be to defer the time at which they would be able to secure a reduction in the price of gas under the sliding-scale. The first generation of consumers could receive nothing but harm; and they would have to find the whole of the £3600. With regard to the suggestion that the Company was seriously over-capitalized, he could not see that they were in any abnormal condition in this respect. At no time since 1876 had they been below what was the maximum and was now the standard.

Replying to Mr. Balfour Browne, witness agreed it was to the advantage of the consumer to have the capital of the undertaking as small as possible. But it was not to the advantage of the consumer to pay interest in their price of gas on the £57,000 of obsolete capital, neither was it to their interest to be called upon to redeem it. He agreed that if the £57,000 were not redeemed, the consumers for all time would be paying interest on it.

The City Treasurer of Liverpool, called as a witness, said he (Mr. Richard Barrow) looked upon the clause as an entirely novel principle.

He agreed, in reply to Mr. Balfour Browne, that the price of gas must include the working cost; and in the working cost, repairs and maintenance, fuel and things of that sort, interest on capital, or dividend, must be included. Thus the smaller the amount of interest on capital, the better for those who had to pay the price for gas.

Mr. RAM then addressed the Committee on behalf of the Corporation of Hove. He said this was a proceeding which would be wisely taken, and the consumers in Hove had no objection at all. But the question was as to who was going to find the money. He contended that the shareholders should pay. They had had the advantage in the past, and would get the advantage in the future. The Company tried to make it appear that they were compelled to incur the removal of their works, which had put upon them a large expenditure. But even if this were so, they would not be justified in calling upon the gas consumers to pay. But it was not the fact that they were compelled to move the works. No doubt it was to the advantage of the Corporations of Brighton and Hove, as well as to themselves, that it should have been done; but the result was a saving of 3s. per ton in the price of coal. It was not the fact that, in order to benefit the two Corporations, the costly removal of the works thus put upon the Company entitled them to any exceptional treatment; and it was unreasonable to expect the consumers to pay a higher price for their gas during the years that would be taken in wiping out the capital as proposed.

Mr. BALFOUR BROWNE, in addressing the Committee in support of the clause, pointed out that everybody agreed that the redemption of the capital was the right thing to do. A similar clause had been given in the case of the Gaslight and Coke Company; and when Sir James Rankin's Committee inquired into that case, the Company were found in default, and no doubt they had been wonderfully extravagant. But the report of that Committee was that an effort should be made by any company having obsolete or unproductive capital to redeem that capital by a sinking fund or otherwise. In the case of the Brighton Company, if the capital were not redeemed the consumers would bear the burden for all time by paying five-sixths of the interest, while the shareholders would bear one-sixth. The consumers would have a delay for a very short time of the reduction in the price of gas; but when the capital was paid off, they would get the benefit to the extent of five-sixths. He admitted that this case was entirely different to that of the Gaslight and Coke Company, because they were not in default. But the real principle of a company was that it ought to have nothing but effective capital. The whole greedy object of the opposition was to force the shareholders to pay everything.

Mr. *Arthur M. Paddon*, the Chairman of the Company, said that after the decision of Sir James Rankin's Committee, the London County Council promoted a Bill with a view of forcing the Gaslight and Coke Company to get rid of their dead capital. The result was that the Council's Bill was withdrawn and the Gaslight and Coke Company's Bill passed; and a provision was inserted that the Council's costs should be paid. He was persuaded that it was good finance to get rid of the dead capital, and that it was far more in the interests of the consumer than the shareholder. The benefit would go on in perpetuity.

Mr. *E. L. Burton*, the Secretary of the Company, gave similar evidence. He said that in the first year there would be a saving of £180, and this would gradually increase year by year. A similar clause to this was inserted in the Bishop's Stortford Bill of the present session; but that clause was struck out when it was pointed out that they had no abandoned works in the same sense.

Mr. *Joseph Cash*, the General Manager of the Company, agreed that the clause was a new departure; but it was one which would be to the advantage of other companies in a similar position. When they put up any very extensive works, the capital expenditure might not be remunerative at once; but the consumers of to-day had, in that case, to pay something for the benefit that would accrue hereafter. Seeing that this £57,000 was a burden that ought to be got rid of, it should be done so that the consumers in after years might get a great benefit.

Mr. *E. H. Stevenson* considered that the operation of the clause would be an equitable one in its present form. The only difference between what was usually done and what this Company proposed to do, was that when works were moved and new ones erected, the value of the old works was paid by the consumer out of revenue over a series of years. In this case, the Company were not in a position to do this, and the matter had been postponed. It was quite fair that the money should be paid by the consumer. If the other process had been adopted and the amount of capital represented by the works had been written off year by year, it would have fallen on the consumer of that day in order that there might be no dead-capital for the consumer of to-day. It was impossible to carry on works such as these from hand to mouth, so that each consumer of a particular day found sufficient for himself and no more. The consumer of to-day had always to pay for the consumer of the future.

Mr. *Charles Carpenter*, the Chairman of the South Metropolitan Gas Company considered there was no doubt that the redemption should come out of the pockets of the consumer. The money had already been laid down in the erection of plant for the manufacture of gas, and another set of plant had had to be provided in order to carry on the undertaking. It would be unfair for the shareholders to pay for their capital twice over.

The Committee decided that the clause should not be amended.

Mr. BALFOUR BROWNE pointed out that since clause 6 had been struck out of the Bill, the County Councils of East and West Sussex were no longer entitled to appear in opposition.

Mr. CHARTERIS, who appeared for the County Council, said he also objected to clause 8 of the Bill.

Mr. BALFOUR BROWNE thereupon promised to strike out this clause also; but, after a discussion, the Committee decided that Mr. Charteris should be heard.

Mr. CHARTERIS then proposed to amend clause 8, with regard to the

breaking-up of roads and bridges for the repairing of service-pipes. He asked that the notice given should be a month, instead of three days.

Mr. *Wood*, the County Surveyor, said the notice given under the Gas-Works Clauses Act had been found insufficient. He agreed (in reply to Mr. Honoratus Lloyd) that they were asking for a variation of the general law; and that their proposal had not been inserted in any previous Bill except by agreement.

Mr. *Paddon*, giving evidence against the proposed amendment, said the Gas-Works Clauses Act, 1847, was passed with the particular object of avoiding these special provisions; and when the Act was amended, the provision relating to this matter was not interfered with. The County Council had never called the Company's attention to the necessity of a longer notice; and their mains within the County area were 5 miles out of a total of 192 miles.

The Committee decided to amend the clause, and altered the period to 14 days.

Mr. CHARTERIS then proposed to amend sub-clause 3 of clause 8, which provided that the rights of the County Council were not to be affected with regard to the alteration or deviation of the main roads along which the pipes of the Company had been laid. The Company were to alter any such mains, and the Council were not to make any compensation to the Company for any expense or loss to which the Company might be put in consequence of any deviation or improvement. He said the clause appeared in numerous Gas and Water Acts, but, so far as he was aware, it had never been argued before a Committee of the House. As the road authority, the Council had to maintain the roads, whereas the Gas Company were working for a profit. As a rule, the pipes were laid in the roadside waste; and if the County Council desired to broaden the road, the effect was to diminish the amount of soil between the pipes and the surface of the road. Consequently the pipes were too near the surface for safety; and the County might or might not be held responsible for any damage done to the pipes. Another instance was where there was an angle in the road. In such a case, the Council purchased land from the adjoining owner, threw the land into the roadway, and the old roadway into the owner's property. But when there were pipes under the road, the owner would not be responsible for them, and the Council then removed the pipes—putting them under the road, and making the Company entitled to compensation from the County for the costs of the removal. He contended that the Gas Company should pay their share of the cost. A similar clause had been inserted in the Stourbridge Gas and Water Order, and the South Staffordshire and Watford Acts.

Mr. LLOYD contended that the clause in the Bill went a great deal beyond the General Law, but was limited in its application to the present Act. The Council were asking that it should be made applicable to former Acts. The clause provided that when the local authority carried out an improvement for the benefit of the public, it was to pay the incidental costs of so doing, and pay for the cost of the removal of the gas-pipes. They were now seeking to provide that they should not make any compensation.

Mr. CHARTERIS said that nowadays, on account of the motor-traffic, the Council had to be continually cutting off short angles in the roads and straightening them.

The Committee, however, declined to amend the clause in the Bill.

The proceedings were then adjourned till yesterday (Monday).

GARNANT GAS BILL.

Among the Bills before the Unopposed Bills Committee of the House of Commons last Thursday was one promoted for the purpose of supplying gas in Garnant.

Mr. BAKER (Parliamentary Agent) explained that the object of the Bill was to incorporate a new Company to supply gas in a district in South Wales which formed part of the anthracite coalfield. The capital was £18,000. There was a population of 5000 or 6000 needing a supply; and the district was very rapidly developing. The Bill had been through the House of Lords.

Mr. *E. R. Fisher*, a colliery proprietor and one of the proposed directors of the Company, said they were already making arrangements for laying down the mains, which would cost between £6000 and £7000 as a first instalment. In the first instance it was proposed they should take gas in bulk from the Ammanford Company, whose area adjoined theirs, and when the business developed, put up their own gas-works. He was a Director of the Ammanford Company, who were in full working order. They were prepared to lay a main to the boundary of the Garnant Company's district. The Ammanford Company bought up the works of the Amman Valley Gas Company by arbitration; but the works and mains had to be renewed. The Ammanford Company had now been in existence for some twelve months. In the Garnant Company they proposed that the price of gas should be 5s. per 1000 cubic feet on a sliding-scale. The mains would probably amount to some 9 miles in length. The price charged by the Ammanford Company was 4s. 3d. There was only a distance of some 2 miles between the works; but he thought that separate works were necessary.

Mr. BAKER remarked that when the supply in Ammanford was taken up, there would be no surplus for Garnant.

Mr. *E. H. Stevenson* said he had instructed the Ammanford Company. The previous Company—the Amman Valley Gas Company—spent something like £25,000 in one way or another, the greater part of which went into certain pockets. Upon arbitration, the Arbitrator awarded a little over £4000 for the whole concern. The Ammanford Company would not be able to supply the Garnant Company after three or four years without very much enlarging the works.

The CHAIRMAN: Supposing the whole district was under your control, would you think it an economical thing to put up separate works so near together, rather than enlarge the existing works?

Witness replied that, if he could combine the whole thing in one, he should prefer to do so. He thought there was the possibility that the Ammanford Company might have taken up the supply of Garnant.

Mr. BAKER pointed out that there would be great difficulty in the Ammanford Company obtaining the capital. All the capital had been subscribed privately. The Directors of this Company were Directors of the Ammanford Company.

Witness, replying to further questions, said that both Companies were a long way from the coalfield; but the two areas adjoined.

The CHAIRMAN: Do you not think that it is very enterprising of these Directors, before they have had their existing powers for one year, to form a Company in Garnant?

Witness: Well, it is a district that must have gas.

The CHAIRMAN said the Committee had considered the matter, and felt that it was really an extension of last year's powers rather than to be looked at as an entirely separate Company; and in view of the practice of Parliament in regard to the 10 per cent. dividend, they were not ready to grant the Bill. What they would be prepared to grant would be a capital of £10,000, which would seem to be quite adequate for mains, meters, and so on, for some years to come, and a maximum price of 4s. 3d., similar to the one granted last year to the Ammanford Company.

Mr. BAKER: Very well, Sir.

LONDON COUNTY COUNCIL (GENERAL POWERS) BILL.

Gas Companies and the Smoke Nuisance.

Further consideration was given last week by the Local Legislation Committee of the House of Commons to Part IV. of the London County Council (General Powers) Bill, which deals with smoke nuisance (*ante* p. 878). Sir FRANCIS LAYLAND BARRATT presided.

Dr. *Millson*, the Medical Officer of Health for Southwark, gave evidence. He said there was a tendency for the smoke nuisance to diminish; and in the case of manufactories it had been less noticeable. Since the decision in the Lots Road case, the difficulty had been largely increased of proceeding against manufacturers.

In reply to the Chairman, Mr. FITZGERALD, who appeared for the promoters, said there was no appeal in the case because it was a question of fact.

The CHAIRMAN remarked that it seemed to him they had a very interesting appeal on the question of what black smoke really was.

In cross-examination, witness said he thought the evidence in the Lots Road case was bad and unsatisfactory. By turning steam into a chimney, it was possible to change black smoke into grey or white; but the nuisance was the same.

Dr. *Owens* was of opinion that smoke was never black. The smoke from blast-furnaces was practically white; but the nuisance depended upon the sooty and other matter contained in it. The emission of dense smoke could be prevented if proper precautions were taken; it depended upon the construction of the furnace and proper stoking. In London, he thought domestic chimneys emitted a greater volume of smoke than manufactories; but with the domestic grate, there was no possible way of preventing it, so long as bituminous coal was burnt. It could only be stopped by using smokeless fuel, which could be burnt efficiently in a grate, and which cost as much as coal. Improvements which had been made in the boilers in Lancashire rendered the use of a cheaper fuel possible. The nuisance then was not greater when the fuel was used with an efficient smoke-preventing device.

In reply to further questions, witness said he was not aware that in the fuel there were ingredients which could not be burnt and were a great nuisance to health. In the use of mechanical stokers, it was necessary that, in lighting a furnace, some smoke must be emitted at first.

Evidence was then given in opposition to this part of the Bill.

Mr. *Merz*, a civil engineer, who stated that there were times when it was absolutely certain that smoke would be emitted which looked very dark; but this applied to large installations with a variable load. With a steady load, smoke ought not to be emitted. He thought, however, that the omission of the word "black" from the Act would leave the matter too much in the hands of the local authorities. If the word "black" were struck out, some perfectly definite clause ought to be given, so that the power companies would know where they were. The clause in the Bill was too indefinite.

Replying to Sir WILLIAM PRIESTLEY, witness said it was only a question of what was reasonable. It was impossible to have a hard-and-fast rule.

Mr. BALFOUR BROWNE pointed out that any such thing as a prohibition of all smoke would put an end not only to the manufactories of the country, but to the electric traction and the electric lighting of London. He agreed that they wanted to get at certain words which would have the effect of stopping the nuisance which was produced (which could be avoided) and at the same time to allow those who were doing their best to prevent a nuisance, and who, by reason either of an accident or an emergency or a sudden call, could not prevent smoke, to be free from penalty. If he had got the best practical installation, if he used it in the best practical way, and if, notwithstanding all his efforts, there was still smoke emitted on a certain occasion (not for days, but for a short period), he was not to be fined for what he could not prevent. He suggested to the Committee a clause which provided that the provisions of paragraph 13 of section 24 of the Act of 1891, and of the section in this Act relating to smoke nuisance, should not apply to the Lots Road Power-House of the Underground Electric Railway Company if (1) the furnaces therein are constructed in such a manner as to consume, as far as practicable, all smoke arising therefrom, or are constructed and managed so as to avoid, under normal conditions, sending forth from the chimney of the said power-house smoke in such quantities as to be a nuisance, and (2) the smoke sent forth from such chimney in such quantities as to be a nuisance was sent forth in consequence of sudden or exceptional demands for electrical energy, or as a result of accident or circumstances beyond the control of the Company.

The CHAIRMAN remarked that the Committee would not consider the question of granting any one works exceptional privileges.

Mr. BALFOUR BROWNE stated that, unlike electric power, the gas

companies had a store of gas in their holders, and could tide over temporary demands. But there were three matters in which they could not possibly avoid making some smoke; and because it was absolutely unavoidable, they asked to have even the protection of the existing Act, or some such clause as he had suggested to the Committee on behalf of the Electric Power Company. He thought the position had been fairly stated by Mr. Millson, who said they all admitted that nuisance meant continuous black smoke for five minutes, or at shorter intervals for ten minutes in the hour. This was a fairly good and reasonable standard, and one with which the gas companies would not have the least difficulty in complying, and avoiding all nuisance. But when they were drawing and charging the retorts, there must be emission of some smoke. Of black smoke there would be none; but there would certainly be some smoke. Accidents, however, might occur. A retort might crack, and by no possibility could they avoid the escape of smoke. In the heated condition they consumed all the particles which were combustible; but when a crack occurred, it was quite impossible to avoid smoke escaping. The only other case they could not deal with was that when hot coke was quenched there was an emission of steam and also of smoke. They had conducted their affairs with excessive care. The South Metropolitan Gas Company had never had any action brought against them; and there were a great many gas-works where there had been no report at all. These undertakings did all they could to get the most value out of the fuel. They had used every possible precaution; and in every respect, with the three exceptions he had mentioned, they could avoid the production of smoke. But in the present Bill they were providing against the emission of any smoke; and this, in the ordinary course of their business, was an every-day occurrence. It was felt that if the law was to be altered in such a way as to make smoke a nuisance and to make the emission of smoke a matter that was to be punished, they could not possibly carry on their undertakings.

Mr. Corbet Woodall's Evidence.

Evidence was then given in support of the opposition of the Gas Companies.

Mr. *Corbet Woodall*, the Governor of the Gaslight and Coke Company, said that, with the exception of the area of the Commercial Gas Company, they supplied gas north of the river, together with a small piece at Nine Elms and Lambeth. They had six manufacturing stations within London; and there were two outside. The Company had always been very sensitive with regard to smoke nuisance; and in consequence of their sensitiveness various of their works had been closed and the manufacturing works had been taken down to Beckton. This was done as a matter of public advantage, although to a certain extent the whole station had become economical. It was urged upon them at the time they abandoned the City of London works at Blackfriars that certain facilities would be given to them if their works were removed down the river. When Parliament dealt with the capital of the Company, there was a provision by which a million pounds was to be paid off in respect of these sites. When the works were removed to Beckton, a considerable number of the up-town stations were abandoned; and it was extremely difficult to write these off from the capital of the Company. It became a matter of reproach to the Company that the price of their gas was high, because the capital was high; and it was ordered that the Company should reduce their capital by a million sterling in order to bring the nominal capital more in agreement with the assets of the Company. Of this amount, they had already written off about £120,000.

In the ordinary process of gas making, they emitted no smoke whatever from their chimneys; but in the event of a retort breaking down, the gas which should go up the ascension pipes escaped into the flues, and went up the chimney. This, however, was of comparatively rare occurrence. Also sometimes a little tar which might rest on the mouthpiece of the retort was drawn into the furnace as the retorts were heated, and it got into the flues and chimneys. But these were all almost negligible matters. The main reason why there occasionally was smoke was that the coke, after the gas had been extracted from the coal, was drawn out and quenched with water. There was just a little gas left in the coke sometimes; and this went up with the steam in a brown-looking smoke, which came out through the ventilators in the roofs of the retort-houses. It never travelled beyond the walls. It condensed very rapidly; and on coming into the atmosphere, it fell upon the curtilage of the works. It would come out from the orifices in the retort-house; and these orifices were within the definition in the Bill of the word "chimney." They would not, up to the present time, have been considered at all with regard to the question of smoke, and they never had been considered.

The Gaslight and Coke Company and the South Metropolitan Gas Company claimed to be very largely interested in smoke abatement; and he thought nothing had been done in the direction of diminishing the smoke nuisance in large towns that would compare with the work of the Gaslight and Coke Company in issuing fires and cooking arrangements to their consumers. The Company had now about 150,000 gas-fires and 430,000 cooking-stoves, some 6000 or 7000 gas water circulators, and an enormous number of incidental apparatus—all of which had displaced fires, and led to a very large diminution in the amount of smoke emitted into the atmosphere. These stoves, &c., were to be found in the very poorest houses, where otherwise there would be a coal-fire. The Company had now some 400,000 prepayment meters, every one of which displaced a coal-fire.

About three sessions ago, the Company were applying to Parliament for permission to amalgamate with a suburban gas company. The Corporation and inhabitants of West Ham were very indignant at the idea of the gas-works being removed from the town; and as a result of a petition presented to both Houses of Parliament, the Company had to agree that for ten years at least they would keep their works in the centre of the district—the point being that if the works were removed, the amount of occupation and employment for labour would be reduced as well as the rateable value of the district.

If the regulations in the Bill were enforced, it seemed very likely that the effect would be in the direction of turning works away and sending them further afield. The cost of this would be enormous; and the effect upon the price of gas would be disastrous—at any rate, to his Company. Recently he was attending a meeting in a suburban borough where the gas-works were spoken of as a "beauty spot" of the neighbourhood. (Laughter.) He pointed this out because it had been said that gas-works interfered with the growth of vegetation. The occasional trouble of the emission of smoke at one period or another would not compare with the advantage from the presence of the works in the places they occupied, and certainly was not to be weighed against the enormous advantage of distributing gas at a low price for the purpose of heating and lighting—particularly heating.

Cross-examined by Mr. J. D. FITZGERALD, who appeared for the promoters, Mr. Woodall said there had been no prosecution against the Company for smoke nuisance, but there had been a complaint which, he believed, was well founded. They were served with a notice of abatement, but were not taken into Court.

Mr. FITZGERALD: You could not be unless you committed a nuisance. You did not continue the nuisance, and nothing more was heard of it?—We did not continue the nuisance. It is always intermittent and for very short periods.

Is it not an axiom of all gas engineers that a properly-managed gas company creates no nuisance?—I think we may fairly claim that.

When a gas company is coming to Parliament to take certain lands for gas-works purposes, some neighbouring owners object on the ground that it may create a nuisance; and the answer always is that a well-managed gas-works creates no nuisance?—Yes; I think that argument always comes up. One sure way to make a nuisance is to cramp the works; and the way to avoid it is to give plenty of space.

Under the existing general law relating to gas companies, there is a distinct enactment that "nothing in this or the Special Act shall exonerate the undertakers from any indictment, action, or other proceeding for nuisance in the event of a nuisance being caused by them"?—That is so.

So that in the present state of the general law applying to gas companies, if a company creates a nuisance of any sort, they are liable?—Yes; but there is an understanding that it must be negligent creation of nuisance. That is to say, the emission of steam, and the kind of smoke I have been speaking of (being a necessary part of the business of a gas company), could hardly be proceeded against as a nuisance.

I think you may take it that for an accidental emission of smoke, or something of that sort, proceedings are not taken?—I cannot agree to "accidental." It is part of the operations of a gas company that we should make steam.

But you have just told us it does not create a nuisance?—I do not think it does.

And therefore you are not liable. You would only be liable for black smoke if it was emitted in such quantities as to be a nuisance?—Yes.

How is your position at all altered by this Bill? You are liable for a nuisance, and you remain liable?—I think in reckoning the ventilators, which would take the steam from the retort-house into the atmosphere, as chimneys, you would lay us open to trouble which at present does not attach; and the removal of the term "black" would also have that effect.

If in either of these ways you commit a nuisance, you are liable to be proceeded against?—Yes; but as I read the proposed Act, it is not necessary to create a nuisance to any neighbour. If we emit black smoke, we are liable to be prosecuted.

You are open to be prosecuted, and you cannot be convicted unless it is proved that a nuisance is created?—Is that so?

Yes; the Act says so, and the Court has so laid it down?—Yes, under the existing Act I admit that; but would it be so under this Bill?

The CHAIRMAN: Would not your proposed clause alter it by making the word "chimney" include any opening through which smoke is emitted. The local authority would be liable to take proceedings against the gas company under section 24, which they could not do at the present time.

Mr. FITZGERALD: It alters the procedure, but not the liability. They could take proceedings against any gas company now under the general law because under their Act of 1871 they are not allowed to create a nuisance. (To witness): So that really the only difference that the Bill makes to a gas company is that the local authority could proceed against the company under section 24 of the Act of 1891, though the smoke was not black, if it created a nuisance. But you say they would be able to proceed against you for a nuisance if you created one by sending smoke out of a ventilator?—Yes.

Is it not much better for you, if you create a nuisance, that the matter should be adjudicated upon by a summary tribunal, where at most you are liable to a small fine, instead of having an action in the Chancery Division with an injunction against you?—I should very much prefer to keep the procedure as it is.

What is the capital of the Gaslight and Coke Company?—About 26 or 27 million pounds.

What is your gross income?—About £2,000,000.

Under these circumstances, you do not mind a Chancery suit, even if it goes up to the House of Lords?—We do not lust after occupation of that sort.

But you would find a comparatively cheap procedure by which you might be brought to book if you were creating a nuisance?—What I very greatly dislike, and deprecate very much, is the prospect of frequent application to the Courts upon trivial matters that at present are not regarded as of sufficient importance to proceed against us.

Mr. HELME: When you take off the covering from the end of the retort, there is a momentary puff of dark smoke which escapes through the ventilators at the side of the building?—Generally, that is so; but I should say with 60 per cent. there is not even that.

Can the escape of that dark smoke be avoided?—That is what I referred to when I spoke of a little tar being deposited on the mouthpiece. When the hot coke gives off that, you get dark smoke.

And that is practically impossible to avoid?—Yes.

Mr. FITZGERALD: When the emission of smoke occurs by throwing water on the coke, you say the smoke did not go beyond the walls of the works?—Almost invariably it is thrown down within the walls.

And accordingly you would not be liable for nuisance?—Different views might be taken upon that.

Under the existing law, you must not create any nuisance, and being under an obligation to carry on your works without creating a nuisance, you want a clause in the Bill that would put you in an entirely different position, and allow you to create a nuisance unless negligence was proved?—I do not know the procedure that is proposed; but I want to leave matters as they are.

Mr. W. Doig Gibb's Evidence.

Mr. *W. Doig Gibb*, the Chief Engineer of the South Metropolitan Gas Company, said he agreed generally with the evidence given by Mr. Corbet Woodall. There had been no prosecutions against the South Metropolitan Gas Company. It was inevitable that on the three occasions mentioned by Mr. Woodall, smoke must be emitted.

Mr. BALFOUR BROWNE: There is the definition now in the word "black," but that is to be taken away and all smoke is a nuisance.

Mr. FITZGERALD: No; the Bill does not say anything of the kind.

The CHAIRMAN: Under the Bill, all smoke might be a nuisance.

Mr. FITZGERALD: I would rather say, may be a nuisance.

Costs of the Tipperary Gas Bill Opposition.

Before the Unopposed Bills Committee of the House of Commons last Thursday, the Tipperary Urban District Council sought to obtain the insertion of a clause in a Local Government Board (Ireland) Order referring to a number of other districts—the clause authorizing them to borrow money to pay the costs of their opposition to the Tipperary Gas Bill in the present session. A letter was read from the Irish Local Government Board stating that, while sympathizing with the object of the District Council, the insertion of the clause in such a Bill was outside their powers, and advised them to take the necessary steps to bring the matter before the Committee who considered the Bill. Mr. M'Donnell, the Parliamentary Agent, having addressed the Committee, they decided that it was outside the purview of the Bill before them, and that they had no power to insert such a clause.

Acton Public Lighting.

The Highways Committee of the Acton Urban District Council have under consideration the following communication from the Brentford Gas Company, in reply to a letter asking if they could make any further reduction in terms for street lighting on an extended agreement: "In view of the improvements in high-pressure gas lighting that have been made recently, we are now in a position to make you this proposal: (1) To light the whole of the Uxbridge Road and Churchfield Road (West) by 1300-candle power inverted lamps, fixed on the existing electric arc columns, at a cost for cleaning, lighting, and maintenance of £12 per lamp per annum. (2) To fix 300-candle power Welsbach self-intensified lamps in positions where there are now electric arc lamps, other than those specified above, for the sum of £5 10s. per lamp per annum. (3) The scheme will also include fixing, at the Company's expense, automatic controllers to all existing gas-lamps, the price of which lamps will be reduced to £3 each per annum. The high-pressure lamps would be extinguished at 1 a.m., and their place taken by 4-feet Kern lamps (the same as now fixed in most of the side roads), which would be lighted at the same time as the others were extinguished. These low-pressure lamps would be fixed on the existing gas-standards. This scheme would give the Council not only the best lighted main road anywhere outside London, but at the same time would effect a very substantial saving in the lighting account. We must, however, point out that, in view of the heavy capital expenditure involved, a contract for not less than ten years is essential."

Norwich Electricity and the Rates.

A Local Government Board inquiry was held into an application by the Norwich City Council for sanction to borrow a large sum for the purposes of their electricity undertaking; and in the course of the proceedings, Mr. E. Wild (the Chairman of the Electricity Committee) said he gathered that Mr. H. R. Hooper (the Inspector) deprecated the dispersion in rate-aid of money that might be made by the undertaking. The following dialogue then took place: The Inspector: Your Engineer would be able to give you better advice than I could; but the first principle is to be absolutely financially sound, and the next is to bring your capital down so as to be able to give the cheapest supply for the benefit of your consumers. Mr. Wild: I anticipated your answer. I asked the question really to strengthen our hands in the position we have taken up in Committee. The only time we departed from our principle was last year, when £1200 was practically wrung from us. The Inspector: It spoils your undertaking; and it does little or nothing for the rates—certainly not for the poor, because the poor do not, of course, pay directly in rates. They pay so much in rental; and therefore they are not affected at all. I take it your Engineer will know very much better than I do how necessary it is to build up a private reserve, especially having regard to the fact that you paid a considerable amount to the Company for the undertaking. Mr. Wild: On the whole, the Council have backed us up; but there was a large amount of clamouring about it a year or two ago. We have made up our minds to set our faces against any more of it; and I thought I should be glad to have your opinion. The Inspector: There can be no greater benefit to the ratepayers than that the undertaking should be sound in every possible way; and the next benefit will be for the ratepayers to have the best possible supply at the cheapest rate.

The Bilston Gas Company have placed an order with Messrs, Robert Dempster and Sons, Limited, of Elland, for one of their electrically operated combined stoking machines, consisting of the "Toogood" charger and the wire-rope discharger, to deal with 12-cwt. charges in 22 in. by 16 in. through retorts. The same firm have also an order for an identical machine for Dumfries, which makes the fourth machine they will have installed in Scotland; these being the only machines dealing with Scotch coals and coke from through retorts.

LEGAL INTELLIGENCE.

WORKMAN'S COMPENSATION CLAIM UNDER APPEAL.

The Southampton Gas Company Successful.

Last Tuesday the Supreme Court of Judicature (Court of Appeal) consisting of the Master of the Rolls and Lords Justices Farwell and Kennedy, had before them the case of Flower *v.* Southampton Gas-light and Coke Company. It was an appeal by the plaintiff from the judgment of Justices Darling and Bucknill, sitting in the Divisional Court, reversing the finding of the County Court Judge in a claim under the Workmen's Compensation Act. Plaintiff sustained an injury to his knee in lifting a gas-stove out of a cart about a mile from the works; and defendants, in ignorance of the true facts, for some time went on paying 11s. a week—plaintiff having elected to be compensated. But on discovering the true facts of the case—that the accident had not occurred "on or about" their works—they discontinued the payments.

The appeal was argued by Mr. BARRINGTON WARD; and, without calling on respondent's Counsel, their Lordships dismissed the appeal with costs.

The MASTER OF THE ROLLS said he had no doubt whatever that the decision of the Divisional Court was perfectly right. Judges must not allow themselves to be influenced by sympathy for persons who met with accidents, but must administer the law as they found it. Plaintiff met with an accident in December, 1906, at a place and under circumstances which did not give him the shadow of a claim to any compensation under the Workmen's Compensation Act, 1907. The accident happened at a place more than a mile from the works; it did not happen "on or about" defendants' works. The man went back to work shortly afterwards, and it was noticed there was something the matter with his knee; and apparently this fact was communicated to the Company. In a report which was made to them, it was stated that the accident happened when the person in charge was Conroy. This person was at the works, and on the premises of the Company; and the statement so made would lead to the belief that the accident had happened on the works when Conroy was in charge. The Company continued to pay until 1908, when they offered to compromise for £50 in full settlement, and which offer was not accepted. Plaintiff might consider himself very lucky to have got 11s. a week from 1906 to 1908. The agreement made in January, 1907, to pay 11s. a week was made in ignorance of a material fact. There was no consideration for it; and the County Court Judge ought not to have allowed it to be registered.

Lords Justices FARWELL and KENNEDY concurred.

A Claim for Gas Poisoning.

Last week, in the Liverpool County Court, his Honour Judge Thomas (who had the assistance as Medical Referee of Dr. Clarke) heard a claim under the Compensation Act which was brought by Mary Smith, a domestic servant, against her late employer. Evidence was called to show that the girl was poisoned by escaping gas from a newly-fitted bracket in her bedroom during the night of March 29, and that she had not yet recovered from the effects of the illness. It was said that she went to bed in good health, without noticing any smell of gas in the room. When she got up the next morning, she was sick and dazed, and vomited when she got downstairs. The girl was taken to Dr. Wallace, who, according to her evidence, said she had been gassed, and treated her for it. After several days, the girl was sent home, and was then attended by Dr. Walton, who gave evidence that the illness was quite consistent with gas poisoning, and that the girl would not have quite recovered for another month. In cross-examination, Dr. Walton said there was not the slightest sign of rheumatism about the patient. The defence was a complete denial of gas poisoning, and an assertion (backed up by medical evidence) that the girl was suffering from rheumatism and stomachic trouble. Mr. Edward Allen, Engineer to the Liverpool Gas Company, said he had seen a large number of cases of "gassing;" and invariably the sufferers recovered completely in an hour or so, or, at most, in a day. Judge Thomas remarked that the Medical Referee agreed with him that the girl had not established that her illness was due to gas poisoning; and his award must be for the respondent, with costs.

A Loss at Bradford.—The balance-sheet for the year ending March 31 was presented by the City Treasurer at the meeting of the Bradford Gas Committee last Friday; and this shows that the loss on the year's working has been £737, as compared with a loss of £5306 the previous year—the position of the department, therefore, having improved to the extent of about £4500. Among the more interesting items of the balance-sheet, are figures which show that there has been a saving in the expenses of manufacture and distribution of £8000; and increased incomes from the hire and sale of stoves and cookers of £1100, and from the sale of gas of £1000. This last-mentioned figure is regarded as very satisfactory, in view of the competition of electricity. There has been a decrease in the income from the sale of coke of £4000.

Matlock Bath Gas Finances.—At the last monthly meeting of the Matlock Bath Urban District Council, the recent trouble which led to the resignation of the Chairman of the Gas Committee (Mr. D. Palmer Pearson) was dealt with officially in the annual report received from the Government Auditor of the accounts (Mr. H. M. Hunt) to the end of March. Mr. Pearson, it may be remembered, complained that he did not get a proper detailed statement of the profits, &c., of certain departments of the Council. According to the Auditor, the improvement scheme (which includes the promenades, &c.) cost the ratepayers in rates 2s. 5¾d. in the year, the sum being £1348, in addition to the 1d. rate for the band. He found that the gas profits had been properly dealt with; and he complimented the Council on the improved state of the book-keeping.

MISCELLANEOUS NEWS.

EDINBURGH AND LEITH GAS COMMISSIONERS.

The Annual Accounts.

It was reported to the Edinburgh and Leith Gas Commissioners yesterday that the balance carried to profit and loss account on last year's working amounts to £125,360. After paying annuities and interest, and contributing £15,686 to the special reserve fund in terms of the 1908 Act, the net balance amounts to £30,774. After meeting sinking and reserve fund charges, there remains £13,564 to be carried forward or added to the reserve fund. The quantity of gas sold was 80 million cubic feet more than in the previous year; but the revenue from gas was less by £2894, consequent upon the reduction in price. The return from residual products was greater by £2637.

PLYMOUTH GAS COMPANY.

Reduction in Price—The Coalite Company and its Difficulties.

The Annual Meeting of the Plymouth and Stonehouse Gaslight and Coke Company was held last Thursday, at the works—Sir JOSEPH A. BELLAMY presiding.

The report of the Directors stated that the price of gas had been reduced from 1s. 10d. to 1s. 9d. per 1000 cubic feet as from September last; and this permitted the paying of an increased dividend. From the credit balance of £30,228, the Directors recommended the payment of a dividend for the half year ending March 31 at the rate of 6½ per cent. per annum on the ordinary stock, with corresponding amounts on the additional and new shares. This would absorb £9961, and leave £20,267 to be carried to the credit of the next account. The increased assessment of the Company's undertaking a year ago caused the Directors to lodge notice of appeal; but this was ultimately withdrawn after due consideration had been given to the advice obtained, and to the altered conditions that had meanwhile arisen with regard to the manufacturing charges. The report also referred to the Standard Burner Bill; and with reference to the coal contracts, it stated that great anxiety has been caused to directors of gas companies and all large users of coal by the unsatisfactory state of the coal market, brought about by the restlessness of the miners and friction between them and the colliery owners since the Eight Hours Act came into operation. The price of coal had considerably advanced in consequence, and higher prices than last year would have to be paid for the Company's supplies.

The balance-sheet showed that the total receipts for the year were £119,751—£99,443 from the sale of gas, £7283 from rentals of gas meters and stoves, and £20,246 from residuals. The expenditure was £88,509, including £70,517 for manufacture of gas, £6376 for distribution, £5159 for rents, rates, and taxes, and £5199 for management. The cost of manufacture was £8520 less than last year; and there were also savings under the other heads, except that of rates and taxes and law and parliamentary charges—the total expenditure being £5201 less than in 1908-9.

The CHAIRMAN said that some saving had been effected in the manufacturing charges by a lower price for coal, and through a proportion of the gas being received from the British Coalite Company. On the other hand, rates and taxes showed considerable increase—indeed, they were practically doubled. This was due to the new assessment to which they had to submit. Law and parliamentary charges were also higher by about £600; the expenditure having been incurred in connection with the rating appeal, and the promotion of the Standard Burner Bill. On the credit side of the account, they had to note the loss of revenue due to the reduction in the price of gas to 1s. 9d. per 1000 cubic feet, which absorbed £4500. The net profit on the year's working was £31,242—an increase of about £2400 over last year. From the amount to the credit of the profit and loss account, £1135 had been allowed for depreciation on investments, £3500 was carried to the revenue fund, and £1000 to the fittings account—a total of £5635; leaving a balance to be carried forward of £30,228.

STANDARD BURNER BILLS.

Describing the proceedings in Parliament with reference to the Standard Burner Bills, Sir Joseph said the big battle had been between the Liverpool Gas Company and the Liverpool Corporation. Like other municipalities, the Liverpool Corporation had an electricity undertaking, while the Liverpool Gas Company worked on a different basis from that of most other English gas companies, and to this extent the other companies had been handicapped. Apparently the Liverpool Corporation were determined to prevent the Bills passing. He understood that they had circularized various members of Parliament, urging them to oppose the second reading. In view of the fact that the opposition of nearly one-half of the corporations that opposed in the first instance had now been withdrawn, and that of the other half nearly all were owners of competing electricity undertakings, he thought that if the House of Commons refused permission for a Committee to hear the evidence, and decide these Bills on their merits, it would be most unfair to the gas undertakings of the companies. To the Plymouth Gas Company it would not be a matter of overwhelming importance. They might save a few hundred pounds in the first instance; but after all they could not hand that over to their shareholders, because by far the greater part of it would have to be to the consumers in the reduction of the price of gas before they earned any dividend for the Company.

COAL AND OIL CONTRACTS.

It was stated in the Directors' report that the price of coal was likely to be higher. Contracts had now been made which showed an increase of 10d. to 1s. per ton in the price of coal. They were, however, paying less for oil; and from the results they hoped to obtain they were well satisfied with the contracts.

THE COALITE PARTNERSHIP.

With reference to coalite, he might say at once that the Directors had no cause to regret that they had entered into partnership with the British Coalite Company. Up to this point he might go. The process had been surrounded with difficulties. Like many other inventions, the idea was good; but when it came to be put into practical working for commercial purposes, for profit, the difficulties were found to be very great, and it had taken considerable time to get over them. He could say this—that the prospects had been steadily improving, and they promised to still go on improving. The results, he thought, justified the experiments made; and a new plant would shortly be put in, by which they hoped to economize 50 per cent. on the charges hitherto incurred. The Coalite Company deserved all the co-operation they could give them, for the pluck they had shown in face of adverse criticism of a most drastic character. He was not going into the point whether or not the "GAS JOURNAL" should have been quite so bitter in opposing the British Coalite Company; but that had certainly not lessened the trials of the Coalite Company. Let them hope they would ultimately receive a proper reward for all the courage they were showing, and for the very large expenditure they were making. Plymouth had become, so to speak, the trial place of this invention; and the trial had not yet reached completion. It was still going on. The prospect was improving all the time; and he trusted ere long that the result would be of such a financial character as would justify the expenditure made and produce dividends for the shareholders.

THE PRICE OF GAS.

The Directors had gone into the figures very carefully; they had made good contracts; they had made economies, and still more were to be brought about; and taking everything into consideration, they had decided to reduce the price of gas. This would be breaking the record. It had been his ambition to bring the price of gas below 1s. 9d. per 1000 cubic feet; and in this the Directors and everyone else had co-operated. They were now able to reduce the price from 1s. 9d. to 1s. 8d. to ordinary consumers, from 1s. 6d. to 1s. 5d. for gas-engines, and to increase the discount to slot consumers. This reduction would entail a falling-off of revenue from ordinary consumers of £3600, and from slot-meters of £1500—making £5100 in all. This was equal to more than a twopenny rate for the borough of Plymouth—a very satisfactory result for a gas company in these days to bring about. The shareholders might be congratulated on the prosperity of the Company, especially in view of the strenuous opposition from the municipal electricity undertaking. He thought they might now consider the Company as producing the cheapest gas in the country, when they took into consideration that they were 300 miles from the coalfields. And this had been done without any harm to the efficiency of the gas-works. The buildings and plant were maintained in such a state of efficiency that they were never better than to-day. The officials and the men had all worked with a will; and the feeling of mutual sympathy and regard which had existed for a long time had been fully maintained. For many years the Company had had a system of paying a bonus of 10 per cent. on the salaries of officials—everything being satisfactory. With regard to the men, the bonus took the shape of a pension scheme for long service and good conduct. He thought gas companies generally might be congratulated upon the stand they were making against the competition of electricity. In London a striking victory had been gained by the Gaslight and Coke Company against electricity used for public lighting. In a contest there as to which was the better, gas light or electric light, the Gaslight and Coke Company had beaten their competitors hollow. This spoke volumes for the energy and ability of gas engineers, and the enterprise of gas companies generally. They must go on, not leaving a stone unturned. These things could not be done without work, and every possible opportunity being laid hold of to take advantage of new ideas, of things which required the risking of a little money to try so as to take the best and be up to date; for no gas company could hold its own that remained behind the times. He should like to see Plymouth streets better lighted. With gas so cheap as it was, he would be pleased to see a larger sized mantle introduced; and he was sure the difference in cost to the ratepayers would be infinitesimal, because even now in many of the lamps where the light was reduced to the size of a thimble the gas consumed was just the same as if the mantle had been three times the size. After all, the lamps had to be put up, and the gas run there to light the thoroughfare; and one could not see the wisdom of the cheeseparing that trimmed these little mantles almost to the vanishing point, and still consumed and paid for the gas. He would like to see larger mantles adopted throughout the town, and Plymouth made one of the best-lighted places in the country. This could be done at practically little extra cost. In conclusion, the Chairman announced that the Directors had decided to extend the Company's mains to the districts of Plymstock, Oreston, Turnchapel, and Hooe, in accordance with the parliamentary powers they obtained some years ago.

In answer to a shareholder, the CHAIRMAN stated that the reduction in the price of gas would be as from March 31 last.

The report and balance-sheet were adopted, and the dividend declared.

Messrs. R. B. Johns, H. S. Wilcocks, and T. Wolferstan were re-elected Directors.

Street Lighting in Hackney.—The Works Committee of the Hackney Borough Council report, with regard to the decision of the Council at their last meeting (*ante*, p. 644) in respect to improved street gas lighting by the substitution of inverted incandescent burners for the existing upright incandescent burners, that they have considered the result of tests made in reference to the suggested adoption of a regenerative lamp instead of the ordinary type of inverted burner, and are of opinion that the increased expenditure of approximately £230 per annum, which would be involved by the adoption of the regenerative lamp, would not be justified. The Committee have therefore, acting under the authority conferred upon them by the Council at their last meeting, given instructions for the ordinary type of inverted burner to be used, in accordance with the offer made to the Council by the Gaslight and Coke Company.

SOUTHWARK PUBLIC LIGHTING.

At a Meeting of the Southwark Borough Council last Wednesday, the Works Committee reported having had under consideration the necessity of some improvement being effected in the lighting of the main roads of the borough. The Committee pointed out that at the present time Southwark compares very unfavourably with the other Metropolitan Borough Councils in the amount expended per mile on street lighting. In April last, 54 lamps in Blackfriars Road were fitted with twin inverted burners, at an additional cost per annum for lighting and maintenance of £122 17s. As a result, the illumination of the thoroughfare had been greatly improved.

The Committee have now had before them the desirability of substituting inverted burners in ten main roads in the South Metropolitan Gas Company's district (244 lamps), in four main roads in the Gaslight and Coke Company's district (65 lamps), and as regards 69 lamps in side-streets in the latter Company's area. In the district supplied by the South Metropolitan Gas Company, the present cost of the upright burner is £3 2s. 10d. per annum; while the cost of the twin-burner lamps would be £5 5s. a year. The cost of conversion is 9s. per lamp. The total cost of conversion will amount to £109 16s., and the additional cost per annum to £515 3s. 3d. In the Gaslight and Coke Company's area, however, the cost of the upright burner is £3 4s. 9d. per annum; while the cost of the twin inverted burner lamp would be £4 18s. 3d., and of the single inverted burner lamp £2 15s. a year. The cost of conversion is 9s. per lamp. There are 134 lamps in the district of the Gaslight and Coke Company, 65 of which will be fitted with twin inverted burners, and 69 lamps in the side streets with single inverted burners. The cost of conversion will be £65, and the extra cost per annum £75 9s. 8d. The total extra cost of lighting the main roads in the borough will be £590 12s. 11d. per annum.

The Committee recommended that the lamps referred to be fitted with inverted burners at the cost named. This was agreed to.

MANCHESTER CORPORATION GAS UNDERTAKING.

Annual Report and Accounts.

We have received from the Superintendent of the City of Manchester Gas Department (Mr. F. A. Price) the report and accounts of the Gas Committee for the year ending March 31; and from them the following particulars have been gathered. The report bears the signature of Alderman R. Gibson, the Chairman of the Committee.

The quantity of coal and cannel carbonized (including the equivalents of enriching materials) was 504,145 tons, compared with 514,446 tons in the previous year; the quantity of gas made per ton being 11,034 cubic feet, against 10,962 cubic feet. The residual products made per ton of coal were: Coke, 13·4 cwt.; tar, 11·55 gallons; ammoniacal liquor, 29·28 gallons. The quantity of gas sent out from the works (5,565,414,000 cubic feet) shows a decrease of 73,037,000 cubic feet, or 1·29 per cent., compared with a decrease of 139,065,000 cubic feet, or 2·41 per cent., the preceding year. The quantity of carburetted water gas produced during the year was 1,053,754,000 cubic feet, compared with 1,125,745,000 cubic feet the previous year. In the production of this gas 2,008,602 gallons of oil and 23,754 tons of coke were used, against 2,541,571 gallons and 24,039 tons respectively for the year ending March 31, 1909. The illuminating power of the gas sent from the works, as tested by the "Metropolitan" No. 2 burner, was 17·63 standard sperm candles. The unaccounted-for gas was 3·34 per cent., which compares with 3·24 per cent. for the previous year.

The number of consumers on March 31 was 178,490, of whom 10,431 were outside the city. The previous year the number was 174,290, of whom 23,160 were outside the city. The total increase was thus 4200. The falling off in the number of consumers outside the city is explained by the fact that the Gorton and Levenshulme urban districts were incorporated in the City of Manchester last November. Of the consumers, 61,046 use prepayment meters. This compares with 58,041 in the previous year—an increase of 3005; and of this increase, 2807 were fixed in the city and 198 in out-townships. The quantity of gas passed by these meters was 539,757,000 feet—an increase of 12,905,000 feet, or 2·45 per cent., on the previous year. The meters were inspected once every five weeks; and the amount collected during the year was £75,304. This is represented by 18,072,950 pennies, weighing 161 tons 7 cwt. 1 qr. 7 lbs.

The number of gas-cookers owned and fixed by the Committee at March 31 was 49,948, compared with 46,391 for the year ending March, 1909. The total quantity of gas that was consumed by cookers is estimated at 656,000,000 cubic feet—being an increase of 43,000,000 feet, or 6·55 per cent., on last year's figures. There have also been fixed 30,559 grillers in connection with prepayment and small ordinary meters. About 45 per cent. of the consumers now have the free use of a cooker or griller. On March 31 last, the number of gas-engines in use was 1613, compared with 1733 in the previous year. The quantity of gas consumed by these engines was 378,642,000 cubic feet—a decrease of 11,995,000 feet, or 3·07 per cent. The cost of coal, cannel, and oil per ton carbonized was 10s. 10·16d., against 11s. 9·14d. the previous year—a reduction of 10·98d. per ton, which, on the total carbonization of 504,145 tons, amounts to £23,065.

The total income was £750,700, against £761,363; and the expenditure £582,808, against £621,341. The gross profit on the year's working was £167,892, out of which the sum of £46,701 was paid for interest on loans, &c. The net profit therefore amounted to £121,191, compared with £89,873 in the previous year. The appropriations for the year exceed the net profit by £8553, towards which sum the balance of the reserve fund (£150) has been applied; and the deficit of £8403 is carried forward to next year's account. The details of the appropriation are as follows: To the sinking fund for redemptions of loans, £67,885; paid over to the city fund, £50,000; extension of carburetted water-gas plant, £379; Cambridge Street depôt, £2162; general extensions, £6240; premiums, &c., on purchases of consolidated 4 per cent. stock for cancellation, £3078.

On Nov. 9, 1909, the Gorton and Levenshulme urban districts were incorporated in the city; and the consequent reduction in the price of gas from 2s. 6d. to 2s. 3d. per 1000 cubic feet means a loss of revenue to the department of £3740 per annum on the consumption at the date of incorporation.

During the year to March 31, 1910, the construction of the eighteen beds of inclined retorts forming the second section of the No. 2 retort-house at the Gaythorn station was completed, and the retorts put to work in November last. A coke-conveyor has been installed for the removal of coke from this section of retorts, which has resulted in a great saving in cost of working the retort-house. An extension of the elevated railway alongside the Manchester South Junction and Altrincham Railway for a length of 200 feet was completed, giving much required additional siding-room for railway waggons. The condensing plant at this station was enlarged and extended, resulting in an increased production of ammoniacal liquor per ton of coal carbonized. The roof on the "B" retort-house at the Rochdale Road station was renewed, and the side walls raised, so that this retort-house can be adapted for any new system of carbonization which it may be considered advisable to instal in the future. These works have been equipped during the year with a telpher coke-conveying plant, which has been of great advantage and economy in the storage of coke. The construction of the gas-holder tank at the Bradford Road station, which was commenced on Oct. 9, 1907, was completed on Dec. 31, 1909. It was tested with water, and found to be perfectly tight. During the year, very good progress was made with the construction of an installation of vertical retorts at the Droylsden station, which will be a guide to the Committee in deciding as to the future method of carbonizing to be adopted in the department.

The total length of mains now laid is 1,650,112 yards, or 937¼ miles and 112 yards; being an increase of 12 miles and 212 yards during the year. The number of public lamps within the city is 20,073, and outside the city 1288—a total of 21,361. The incandescent system of lighting has been applied to all the lamps within the city; and the number of burners fixed thereto is 25,377.

The following are the principal items in the accounts:—

REVENUE ACCOUNT.

INCOME.

Gas-rental—						
Ordinary meters					£491,002	6 10
Prepayment meters					75,304	0 6
Public lamps					40,690	7 8
Residual products—						
Coke	£80,947	19 1				
Tar	27,088	10 7				
Sulphate of ammonia	34,605	13 10				
					142,642	3 6
Rents of cottages, &c.					1,061	1 3
					£750,699	19 9

EXPENDITURE.

Manufacture—						
Cannel, coal, and oil (including cost of unloading, &c.)	£273,423	14 3				
Coke, water, &c. (carburetted water gas)	8,264	9 5				
Carbonization (wages)	43,541	12 11				
Retorts, fire-bricks, &c.	7,886	9 1				
Repairs and maintenance of works, &c.	44,340	3 7				
Salaries of Engineer and works staff (less proportion transferred, £1731 4s. 2d.)	6,862	8 6				
	£384,318	17 9				
Less received for spent oxide in excess of cost of purification	397	10 7				
	£383,921	7 2				
Provision for renewal of works plant (less £1269 17s. 11d. charged to sulphate of ammonia)	20,101	0 0			£404,022	7 2
Distribution—						
Repair and maintenance of mains, services, meters, and stoves	£34,097	6 8				
Salaries (less proportion transferred, £500)	27,125	1 2				
	£61,222	7 10				
Provision for renewal of distribution plant	34,592	0 0			95,814	7 10
Rents, rates, and taxes					56,870	19 7
Management—						
Salaries	£16,154	7 9				
General charges	5,790	1 5				
					21,944	9 2
Law and parliamentary charges					955	12 11
Subscriptions, donations, &c.					2,284	14 9
Bad debts					915	6 7
					£582,807	18 0
Balance carried to profit and loss account					167,892	1 9
					£750,699	19 9

The accounts are followed by the usual appendices, furnishing particulars in regard to the progress of the undertaking.

Appendix A is an abstract of the capital, revenue, and profit and loss accounts. It shows (*inter alia*) the amount of gross profit made from the gas undertaking, and the mode of its appropriation, also the amount of borrowed money owing, excess of assets, &c., from March, 1890, to March last. The figures for the past financial year are as follows: Gross profit, £169,244; net profit, £121,191; contributed to sinking fund for redemption of debt, £67,885; paid over for improvement purposes and city fund, £50,000; applied in extension of works, £11,859; borrowed money owing, £1,212,684; and excess of

assets, £1,748,744. From June 24, 1843, the date when the works were taken over by the Corporation from the Commissioners of Police, the gross profits on the gas undertaking have amounted to £6,229,567, out of which £1,514,658 has been paid for interest—leaving a net profit of £4,714,908. Of this total, £1,536,729 has been placed to the sinking fund, £2,639,383 has been handed over to the Improvement Committee and added to the city fund, £329,202 has been paid for street lighting (making £2,968,585 used in relief of rates), and £219,100 applied to extensions of works.

Appendix B is a comparative statement of the gas transmitted from the works in the daytime and during the twenty-four hours, for the past two years. Summarized, the figures are as follows:—

	Daytime. Cubic Feet.	Twenty-four Hours. Cubic Feet.
Year ended March 31, 1910 . .	1,842,103,000 ..	5,565,414,000
Do. Do. 1909 . .	1,869,399,000 ..	5,638,451,000
Decrease	27,296,000 ..	73,037,000
		Cubic Feet.
Gas transmitted from the works		5,565,414,000
Do. accounted for		5,379,439,000
Loss (by condensation and leakage)		185,975,000 or 3·34 per cent.

In Appendix C, particulars are given as to the results of the working from March 31, 1892, to March 31, 1910. The table contains statistics as to the number of tons of coal and cannel carbonized, the total make of gas, the percentage unaccounted for, the yield per ton of coal, the illuminating power of the gas, the quantity of residual products, &c., each year in the above-mentioned period. The particulars for the past financial year are as follows: Coal and cannel carbonized, 504,145 tons; gas made, 5,562,679,000 cubic feet; yield per ton of coal carbonized, 11,034 cubic feet; illuminating power, 17·63 candles; quantity sold, 5,319,644,000 cubic feet; quantity sold per ton, 10,552 cubic feet; percentage of output unaccounted for, 3·34; coke for sale, 208,333 tons; do. per ton of coal, 10·21 cwt.; make of tar, 26,787 tons; do. per ton of coal, 11·55 gallons; ammoniacal liquor (10-oz. strength) made, 11,956,613 gallons; do. per ton of coal, 29·28 gallons; sulphate made, 4259 tons; do. per ton of coal, 24·97 lbs.

Appendix D shows the number of stoves and of each size of meter in use during the year in the city and out-townships. At the close of the past financial year, there were 45,758 stoves within, and 4190 beyond, the city—together 49,948, compared with 39,359 and 7032 (together, 46,391) at the corresponding date in 1909; so that there was an increase of 3557. The number of meters in use was 178,490 in 1910 and 174,290 in 1909. There was last year a net increase of 4200 on the number for the preceding year. The number of prepayment meters in use on March 31 last was 61,046—an increase of 3005 on the number at the close of the preceding year.

From Appendix E, we learn that the gas-mains laid last year within the city extended to 26,554 yards, and beyond the city to 4716 yards; being 17¾ miles and 30 yards. The mains taken up were 9747 and 191 yards respectively—a total of 9938 yards, or 5¼ miles and 258 yards. The total net increase during the past year, therefore, was 21,332 yards, or 12 miles and 212 yards. The total length of mains on March 31 last was 1,650,112 yards, or 937¼ miles and 112 yards.

At a meeting of the Gas Committee last Wednesday, the report and accounts were presented.

Alderman GIBSON said that the report might be considered as fairly satisfactory. The percentage of profit on capital was 5·83 as against 4·98 in 1909. The department had 4200 more customers in 1910 than in 1909; but there had been a decrease in consumption of 1¼ per cent. The Committee had been enabled to buy coal on better terms this year than last year; but in a greater degree, however, the increased profit was due to economies of management and administration. The manufacturing charges in 1910 were 11·79d. per 1000 feet of gas sold, against 12·92d. in 1909. Distribution charges came to 4·32d., against 4·8d. in the corresponding period; and management charges to 1·18d., as against 1·20d.—the total charges being 17·29d., as against 18·92d., a reduction of 1·63d. The Gas Department felt to some extent the competition of the Electricity Department. Questions arising between the two Committees were, however, being threshed out; and he did not doubt that a satisfactory conclusion would be arrived at. In the meantime, he thought the Gas Committee might be congratulated upon having had a successful year. The prospects for the year before them were quite promising. In his long experience of the Gas Committee's undertaking, he believed it was never in a more sound financial position than it was to-day from every point of view. The public were never better served, they never had gas at a less price, and the streets were never better lighted. Their debt was being rapidly paid off; and the works were being maintained in a thoroughly efficient state.

STOURBRIDGE GAS UNDERTAKING.

In his fifth annual report to the Stourbridge Urban District Council on the working of the gas undertaking for the year to March 31 last, Mr. C. H. Webb, the Engineer and Manager, says that the sales of gas (ordinary, prepayment, and public lighting) show a considerable increase of 7,431,200 cubic feet, as compared with the previous year. At the same time, the make of gas has only increased 3,825,000 cubic feet, which means that the gas unaccounted for has been reduced by more than 3½ million cubic feet, or almost 2 per cent. on the amount of gas made. The revenue account shows increased income from the sale of gas, and also from tar and sulphate of ammonia; but coke has realized slightly less—the total increase on this side of the account being £928. The expenditure for the year is less by £255; coal having been somewhat cheaper. These differences increase the balance carried to profit and loss account by £1183; the gross profit being £11,931. After due deduction of income-tax, annual instalments, and interest—which items are all greater than last year, as is also the expenditure on stoves—there remains as a surplus £2508, or an increase of £299. The usual percentage to be devoted to relief of the rates (75 per cent.) gives £1881. There have been laid about 2 miles of mains in the year; and 22 ordinary and 201 prepayment meters and 344 stoves have been fixed.

The accounts show that the gas made amounted to 216,676,000 cubic feet, of which 197,989,000 feet were sold, 2,832,900 feet used on the works, &c., and 15,853,200 feet, or 7·31 per cent., were unaccounted for. The expenditure on revenue account was £24,637; and the receipts were £36,569. The make of gas per ton of coal carbonized was 10,909 cubic feet; and the net proceeds of residuals came to 66·99 per cent. on the cost of the coal.

SMETHWICK GAS SUPPLY.

The Annual Report.

At a Meeting of Smethwick Town Council last Tuesday, there was submitted the report of the Secretary (Mr. W. J. Sturges) on the work of the Gas Department for the year ending March 31.

The loan indebtedness stands at £178,819; a reduction during the year of £13,388. There remains in the sinking fund the sum of £36,225; and deducting this from the outstanding debt, there is left a net indebtedness of £142,594. The capital outlay account has not been added to during the year; the total expenditure remaining at £217,048, equivalent to 10s. 2d. per 1000 cubic feet of gas sold, as against 10s. 4d. the previous year. The total income for the year on revenue account was £65,108, an increase of £1464. The set-back in the sale of gas experienced for the first time in the previous accounts has been arrested, and an increase of £1669 in the revenue from that source is now shown. This is mainly due to the prepayment consumers, whose consumption has gone up 9·28 per cent. Small ordinary consumers have taken 2·28 per cent. more; and there is an increase of 2·03 per cent. in the quantity supplied for public lighting. While a slight reduction is shown in the large consumers for lighting, the quantity of gas sold for motive power and manufacturing purposes shows signs of recovery. The total quantity of gas sold and accounted for was 426,712,860 cubic feet, an increase of 8,131,500 cubic feet, or 1·94 per cent. The quantity unaccounted for, due to leakage and condensation, was 22,648,200 cubic feet, equal to 5·04 per cent. of the gas sent out from the works, compared with 23,224,700 cubic feet, or 5·26 per cent. The total number of collections from prepayment meters during the year was 101,959, an increase of 28,977. The average amount per collection was 3s. 1d.; the average amount collected per meter for the year, 38s. 11d.; and the average consumption per meter, 11,675 cubic feet. The number of ordinary meters fixed at the end of the year was 3737, an increase of 83; and the number of prepayment meters was 8298, an increase of 680. The number of cooking-stoves fixed on hire was 1602, an increase of 592. There were also fixed on hire purchase during the year 89 outside lamps for shop lighting. The income derived from residual products has not expanded with the gas revenue. On the contrary, there is a decrease in the total receipts amounting to £252. The total trading expenditure during the year amounted to £47,001, an increase of £1369. The total charges for the manufacture of gas, including maintenance and renewals of works and plant, show an increase of £615. The cost of coal is £1302 higher. Less water gas having been made during the year, the items for oil and coke are lower by £344; and repairs and maintenance of works cost £299 less. Distribution expenses have risen during the year; the total expenditure under this head showing an increase of £497. The total value of the public lighting supplied free of charge is £4367; and the number of lamps in use at the end of the year was 1233, an increase of 23. The gross profit for the year amounts to £18,107, as compared with £18,012, an increase of £95. The balance standing to the credit of profit and loss account at the commencement of the year was £7108; and to this is added the gross profit from revenue account—£18,107. Against the gross profit has been charged the necessary provision for interest on loans and for redemption and extinction of debt, amounting in the aggregate to £10,704, leaving a balance of £7403 as the net profit for the year. After deducting the cost of public lighting, £4367, contributed by the Gas Committee in aid of the district rate, and £1000 for the fifth and final instalment of the Committee's contribution of £5000 towards the cost of the Council House, there remains a balance of £2035, which has been transferred to depreciation and suspense fund account; and the profit and loss account closes with £7108 in hand. The depreciation and suspense fund has been charged with expenditure on account of new exhausters £1041, and for the purchase of new meters £1652; leaving a balance of £391 to carry forward.

Alderman PINKNEY (the Chairman of the Gas Committee) said the system of free fixing of services, meters, and stoves which had been adopted was very satisfactory. They were determined to make every improvement possible to keep to the front. At the present time, many of the gas-works were carrying out their street lighting more cheaply than Smethwick; and while they considered sentiment, they must not allow it to govern them altogether. He believed that eventually they would have to adopt automatic street lighting, which would reduce labour considerably. The Committee were also considering the question of an automatic system of carbonization. They were spending about £2000 in the installation of new machinery; and all improvements and alterations would be carried out from the revenue account. He was hopeful that the Committee would later on be able to sell gas for domestic purposes other than lighting at a very cheap rate. Since they began to contribute to the rates, they had relieved them to the extent of about £40,000; while during the same period the price of gas had been reduced to nearly all classes of consumers.

The report was adopted.

Brighton Water-Works Profits.—The whole of the past year's profits on the Brighton Water-Works are to go to relieve the rates. The recommendation of the Committee was that £2000 should be paid to the relief of the rates, and £889 be placed to the contingent fund, which now stands at some £14,500. The idea of members of the Town Council appeared, however, to be that the contingent fund was already quite large enough.

GAS-WORKS RESULTS AT OSSETT.

The report of Mr. A. E. Mottram, the Gas Manager, which was adopted at the monthly meeting of the Ossett Town Council, stated that during the year to March 31 there had been made 116,259,000 cubic feet of gas, of which 109,511,400 feet (or an increase of 2,236,000 feet) were sold. The proportion unaccounted for was 5¾ per cent. The make per ton was 10,978 cubic feet, compared with 10,910 feet. The gross profit was £7247; while the interest and sinking-fund charges amounted to £6493, and there was paid off the balance of slot-fittings account £425. This left a balance of £329, which was carried to the reserve fund. The price of gas was reduced 3d. per 1000 cubic feet as from Oct. 1, 1908; so that for the first two quarters the previous year the price was 3d. per 1000 cubic feet more than had been charged throughout the past year—the reduction amounting to £442. The general trade of the district has been better; and this has led to an increased consumption of gas. The increase has, however, been checked by the more general use of incandescent burners. The ordinary consumers number 3862, and the slot-meter users 3582—a total of 7444, or an increase during the year of 239.

In moving the adoption of the Gas Committee's minutes, the Chairman (Mr. H. Robinson) said that the results of the past year were among the best they had had. The success from every standpoint was as great as they could expect; and he paid a tribute, not only to the marked ability, but to the intense interest, devotion, and enthusiasm that had been displayed by all parties concerned, from the Manager down to the humblest workman. There were two outstanding features of the balance-sheet that were unique in their history, and as pleasing as they were exceptional. They saw the end of the last suspense account. Two years ago the slot-fittings account stood at £1040; last year £624 was paid off, and this year the account was discharged by applying £425. The other striking feature, about which he was more pleased, was the initiation of a reserve fund. The necessity for such a fund everybody would admit. Though the sale of gas last year was a record one, the make was not. This spoke well for the improved condition of the undertaking. There had been a great saving in unaccounted-for gas.

Other members expressed themselves as being equally well satisfied with the condition of affairs; and the minutes of the Committee were adopted.

HEBDEN BRIDGE GAS UNDERTAKING.

At a Meeting of the Hebden Bridge and Mytholmroyd Gas Board, Mr. A. Sutcliffe, dealing with the annual report of the undertaking, said that the gross profits for the year had been £4618, which, compared with 1909, was £386 more. This increase was due partly to the decrease in the contract prices of coal, which had effected a saving of something like £200, and partly to the fact that the gas made per ton was better than in 1909. On the other hand, they had to set against this a reduction in the price of gas in 1909. In the early part of that year, the price was considerably higher than it was at the present time. The Board were satisfied that the period under review had been one of the best years. Their output had been something like 90,000,000 cubic feet, which, with one exception (1908), was the maximum. From the gross profits they had to deduct the amount of the year's dividend on the 3 per cent. redeemable stock, and interest on mortgage loans. They had also to provide for instalments to the redemption and sinking fund account (£1013); and £249 had to be allocated to the repairs and renewals fund for cooking-stoves. After making these deductions, they were left with a net profit of £805, as against £435 last year—an increase of £370. The amount of stock up to the present issued was £86,300. They had set aside towards the liquidation of this sum £18,422, in accordance with the provisions of the Board's Act of 1895; while the profits accumulated from the date of the taking over of the undertaking from the old Gas Company to March 31 last amounted to £5936. They had paid over to the two Councils since 1895 profits amounting to £1800; and altogether something like £30,556 had been set aside out of revenue. The capital account was now £92,863, whereas in 1896 it stood in the balance-sheet at £70,890; so that during the past fourteen years about £22,000 had been added. The gas-mains extended for about 50 miles. Turning to the revenue account, they would find that the sale of gas had realized £11,102; and it spoke well for the management that the total of bad debts for the year only amounted to £11. On the whole, he took it that the report and balance-sheet were very favourable indeed.

EXPLOSION AT THE WAKEFIELD GAS-WORKS.

Alarm was caused in the vicinity on Monday afternoon of last week by an explosion at the gas-works in Vicarage Street, Wakefield. It appears that while some men were riveting a plate on one of the purifiers, one of them put a pair of red-hot tongs near a spot where there was obviously a leakage—air having become mixed with the gas. The resultant explosion did a good deal of damage, and more or less seriously injured three men who were near. After receiving first-aid attention on the spot, the sufferers were removed to hospital; but fortunately it was found necessary to detain only one of them. Considering that a number of men were at work near the scene of the accident, it is matter for congratulation that the list of those who received injury was so short. The Engineer and Manager (Mr. H. Townsend), his sons, and others were soon on the spot directing operations; and the fire brigade promptly extinguished flames which broke out among a portion of the wreckage. The damage caused was somewhat extensive—being estimated at several thousand pounds. It is, however, covered by insurance.

The Thorney Gas, Coal, and Coke Company is the re-registration as a limited company, under the Companies (Consolidation) Act, 1908, of a Company originally registered in 1865, as an unlimited company. The capital is £1400 in £5 shares, all of which were taken up and fully paid prior to the re-registration. The registered office is at Thorney, Cambs.—Another old Company re-registered is the Tring Gaslight and Coke Company, Limited, with a capital of £11,000 in £10 shares. The offices are Parsonage Place, Tring.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 935.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,474,000	Stk.	Apl 1	5	Alliance & Dublin Ord.	82–84	..	5 19 1
310,000	Stk.	Jan. 13	4	Do. 4 p.c. Deb.	100–102	..	3 18 5
200,000	5	May 12	7	Bombay, Ltd.	6⅞–6⅞	..	5 9 10
40,000	5	,,	7	Do. New, £4 paid	4⅝–5⅛	..	5 9 3
350,000	10	Feb. 25	15	Bourne-mouth Gas and Water } to p.c. B 7 p.c. Pref. 6 p.c.	29–30	..	5 0 0
311,810	10	,,	7		16½–16⅝	..	4 3 7
75,000	10	,,	6		15–15½	..	3 17 5
380,000	Stk.	,,	12½	Brentford Consolidated	251–254	..	4 18 5
300,000	,,	..	9¾	Do. New	183–190	..	5 0 0
50,000	,,	Aug. 12	5	Do. 5 p.c. Pref.	120–122	..	4 2 0
206,250	,,	June 10	4	Do. 4 p.c. Deb.	99–101*	..	3 19 3
220,000	Stk.	Mar. 16	11	Brighton & Hove Orig.	214–217	..	5 1 5
246,320	,,	,,	8	Do. A Ord. Stk.	152–155	..	5 3 3
460,000	20	Apl. 1	10⅝	British	44–45	..	4 14 8
109,000	Stk.	Feb. 25	6	Bromley, A 5 p.c.	118–120	..	5 0 0
165,700	,,	,,	4½	Do. B 3½ p.c.	88–90	..	5 0 0
82,278	,,	,,	5½	Do. C 5 p.c.	105–107	..	5 2 10
55,000	,,	Dec. 29	3½	Do. 3½ p.c. Deb.	87–89	..	3 18 8
500,000	10	Oct. 14	7	Buenos Ayres (New) Ltd.	—	..	—
250,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb.	98–100	..	4 0 0
100,000	10	—	—	Cape Town & Dis., Ltd.	3⅛–4¼	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	5⅜–6⅛	..	—
50,000	50	May 3	6	Do. 6 p.c. 1st Mort.	49–50	..	6 0 0
100,000	Stk.	Dec. 29	4½	Do. 4½ p.c. Deb. Stk.	90–92	+1	4 17 10
157,150	Stk.	Feb. 25	5	Chester 5 p.c. Ord.	109–111	..	4 10 1
1,513,280	Stk.	Feb. 25	5⅛	Commercial 4 p.c. Stk.	107–109	..	4 15 5
560,000	,,	,,	5	Do. 3½ p.c. do.	103–105	..	4 15 3
475,000	,,	Dec. 29	3	Do. 3 p.c. Deb. Stk.	81–83	..	3 12 3
800 000	Stk.	June 10	5	Continental Union, Ltd.	91–96*	–1	5 4 2
200,000	,,	,,	7	Do. 7 p.c. Pref.	135–137*	..	5 2 2
492,270	Stk.	—	·½	Derby Con. Stk.	121–123	..	4 9 5
55,000	,,	—	4	Do. Deb. Stk.	104–105	..	3 16 2
148,995	,,	Apl. 1	5	East Hull 5 p.c. Ord.	96–98	..	5 2 0
486,093	10	Jan. 27	12	European, Ltd.	24⅞–25⅞	..	4 17 0
354,060	10	,,	12	Do. £7 10s. paid.	18½–19½	..	4 16 0
16,198,673	Stk.	Feb. 10	4⅝	Gas light and Coke } 4 p.c. Ord.	104–105	+½	4 8 10
2,600,000	,,	,,	3⅛		88–90	..	3 17 9
4,062,235	,,	,,	4		104–106	..	3 15 6
4,531,706	,,	Dec. 29	3	3½ p.c. Con. Pref.	81–83	..	3 12 3
258,740	Stk.	Mar. 16	5	Coke } 3 p.c. Con. Deb.	93–95	..	5 5 3
82,500	,,	,,	6½	Hastings & St. L. 3½ p.c.	117–119	..	5 9 3
70,000	10	Apl. 29	11	Do. do. 5 p.c.	17–17½	..	6 5 9
131,000	Stk.	Mar. 16	7	Hongkong & China, Ltd.	145–147	..	4 15 3
65,782	,,	,,	5⅜	Ilford A and C	108–110	..	5 0 0
65,500	,,	Dec. 29	4	Do. B	100–102	..	3 18 5
4,940,000	Stk.	May 12	8	Imperial Continental	178–180	+1	4 8 11
1,235,000	Stk.	Feb. 10	3½	Do. 3½ p.c. Deb. Red.	94–96	..	3 12 11
195,242	Stk.	Mar. 16	6	Lea Bridge Ord. 5 p.c.	122–124	..	4 16 9
561,000	Stk.	Feb. 25	10	Liverpool United A.	219–221	..	4 10 6
718,100	,,	,,	7	Do. B	164–165	..	4 4 10
306,083	,,	Dec. 29	4	Do. Deb. Stk.	106–108	+1	3 14 1
75,000	5	Nov. 26	6	Malta & Mediterranean.	4⅛–5	..	6 0 0
560,000	100	Apl. 1	5	Met. of 5 p.c. Deb.	100–102	..	4 18 0
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	100–102	..	4 8 3
541,920	20	May 27	3½	Monte Video, Ltd.	12⅜–13	..	5 7 8
1,775,892	Stk.	Feb. 25	4⅜	Newc'tle & G'tesh'd Con	103–104	..	4 8 11
529,435	Stk.	Dec. 29	3½	Do. 3½ p.c. Deb.	91–93	..	3 15 3
55,940	10	Feb. 25	7	North Middlesex 7 p.c.	15⅞–15⅞	..	5 1 10
300,000	Stk.	Apl. 29	8	Oriental, Ltd.	138–140	..	5 14 4
60,000	5	Apl. 1	8	Ottoman, Ltd.	6–6¼	..	6 8 0
31,800	53	Feb. 25	13	Portsea Island A.	134–136	..	5 1 0
60,000	50	,,	13	Do. B.	126–128	..	5 1 7
100,000	50	,,	12	Do. C.	119–121	..	4 19 2
114,800	50	,,	10	Do. D and E.	100–102	..	4 18 0
398,490	5	Apl. 29	7	Primitiva Ord.	7⅛–7⅜	..	4 13 4
796,980	5	Jan. 27	5	Do. 5 p.c. Pref.	5⅜–5⅝	..	4 8 11
488,903	100	June 1	4	Do. 4 p.c. Deb.	97–99	..	4 0 10
1,000,000	10	Oct. 14	8	River Plate Ord.	—	..	—
312,650	Stk.	Dec. 29	4	Do. 4 p.c. Deb.	99–101	..	3 19 3
250,000	10	Apl. 1	9	San Paulo, Ltd.	15⅜–15⅝	..	5 14 3
62,500	10	,,	6	Do. 6 p.c. Pref.	11⅞–12⅛	..	4 18 0
125,000	50	Jan. 3	5	Do. 5 p.c. Deb.	50⅛–51⅛	..	4 17 1
135,000	Stk.	Mch. 16	10	Sheffield A	232–234	..	4 5 5
269,984	,,	,,	10	Do. B	232–234	..	4 5 5
523,560	,,	,,	10	Do. C	232–234	..	4 5 5
70,000	10	May 27	7	South African	11–11⅛	..	6 1 9
6,429,895	Stk.	Feb. 10	5/9/4	South Met., 4 p.c. Ord.	120–122	..	4 9 7
1,895,445	,,	Jan. 13	3	Do. 3 p.c. Deb.	80–82	..	3 13 2
209,820	Stk.	Mar. 16	8	South Shields Con. Stk.	157–158	..	5 1 3
605,000	Stk.	Feb. 25	5⅜	S'th Suburb'n Ord. 5 p.c.	121–123	..	4 12 0
60,000	,,	,,	5	Do. 5 p.c. Pref.	121–123	..	4 1 4
117,058	,,	Jan. 13	5	Do. 5 p.c. Deb. Stk.	122–124	..	4 0 8
502,310	Stk.	May 12	5	Southampton Ord.	110–112	..	4 9 3
120,000	Stk.	Feb. 10	6¼	Tottenham A 5 p.c. and B 3½ p.c.	133–135	..	5 1 9
453,940	,,	,,	5⅜		113–115	..	4 13 6
149,470	,,	Dec. 29	4	Edmonton 4 p.c. Deb.	59–101	..	3 19 3
182,380	10	June 10	8	Tuscan, Ltd.	9–9¼*	..	8 8 6
149,900	10	Jan. 3	5	Do. 5 p.c. Deb. Red.	99–101	..	4 19 0
230,476	Stk.	Feb. 25	5	Tynemouth, 5 p c max.	113–115	..	4 0 11
255,636	Stk.	Feb. 25	6⅜	Wands-worth B 3½ p.c. 3p.c. Deb. Stk.	139–141	..	4 14 0
79,416	,,	Dec. 29	3		74–76	..	3 18 11

Prices marked * are "Ex div."

CHARGE FOR PUBLIC GAS LIGHTING AT TOTTENHAM.

At the Meeting of the Tottenham Urban District Council last Tuesday, a letter was received from Mr. E. Topley, the Secretary to the Tottenham and Edmonton Gas Company, in reference to the request of the Council for a reduction in the charge for public lighting.

The writer said that the matter had had the careful consideration of his Directors, who, in the first place, desired him to thank the Council for their notification that they were asking the Electric Light Company for a competitive tender for the public lighting of the district. To this the Gas Company could have no possible objection, provided, of course, that in making the comparison the relation of the total effective candle power to cost was taken into consideration in both cases, that maintenance charges for both systems were included, and that the hours of lighting and period of contract were the same. In this regard, the Directors ventured to point out that lamps giving (say) 1000 candles placed 20 feet from the ground gave only at each angle the same light as 250 candles would give at 10 feet from the ground; the proportion being inversely to the square of distance. The price charged by the Gas Company for public lighting was at present so low, compared with the charge to the general public, that there was little margin for a reduction; but anticipating that during the next ten years economies would be made in gas manufacture, which would enable the Company to reduce further their charges to ordinary customers, they offered to supply the whole of the "C" or "Howellite" duplex lamps, of 60 to 70 candle power, at present existing, for a period of ten years at the rate of 51s. per lamp per annum, less 4 per cent. for prompt payment. This would be a reduction of 2s. per lamp, and would bring the net price to 48s. 11·52d., which, divided by 365 days, gave the Company 1·61d. per lamp per night for supplying gas, mantles, and other accessories, for cleaning each lamp weekly, for lighting and extinguishing, and for supervision, office charges, and profit. For special lamps, the prices upon a ten years' contract would be: No. 4 Kern, £3 2s. 6d.—a reduction of 3s. 6d.; 700-candle Lucas, £11 5s.—a reduction of 13s.; 400-candle Lucas, £6 10s.—a reduction of 8s.; and 200-candle Lucas, £4 10s.—a reduction of 7s.

A letter from the Metropolitan Electric Lighting Company was read stating that they were not prepared to offer a tender for the lighting of the whole district, unless allowed to submit a price for a minimum period of five years; but if permitted to tender for those areas in which their mains were laid, they could do so for a minimum period of three years.

The Council referred both letters to Committee.

The Local Government Board have granted the application of the Petersfield (Hants) Rural Authority for the borrowing of a further £800 for the water supply for Liss; but stipulation is made that the loan is to be applied only for the extension of mains.

ELECTRICITY V. GAS IN HORNSEY.

A Protest from the Tradesmen's Association.

Mr. J. Howard Dunn, Secretary of the Borough of Hornsey Tradesmen's Association, has addressed the following letter to the Town Clerk.

I am desired by my Association to call the attention of your Council to the report, as received from the Finance and Works Sub-Committee, in regard to the improvement of artificial lighting at the Stroud Green School. On March 21, my Association sent a letter to the Chairman of that Committee asking them "to very carefully consider the cost of lighting, by electricity and by the modern method whereby gas may be used with efficiency, both as regards heating and ventilating, as well as for lighting, and this at a very much less cost than by electricity; and my Association urge that your Committee consider the fact that gas is much cheaper in its maintenance than electricity. They feel sure that just now, when traders have not recovered from the depression so generally prevalent, you will not consider a scheme which will add to their burdens."

To this letter, no reply was received until I wrote again, when my Association were referred to a report published by the Press. This report states that the Committee were of opinion that the electric light should be installed in the Stroud Green School. My Association are very much surprised that this decision has been arrived at, and respectfully call the attention of the Council to the differences in the estimated expenditure necessary to instal (*a*) electricity and (*b*) gas:—

To Instal Electricity.

	£	s.	d.
Not less than	300	0	0
Consumption for (say) 400 hours, and 11 units per hour, at 3d.	55	0	0
Renewals, one lamp per year, or 342, at 2s.	34	0	0
Interest and repayment of capital, 20 years, at 7 per cent.	21	0	0
Total cost first year	£110	0	0

Gas.

	£	s.	d.
Offer from Gaslight and Coke Company	*Nil.*		
Consumption of gas at 1s. 8d. per 1000 cubic feet	33	6	0
Renewals as per offer for first year	*Nil.*		
Interest, &c.	*Nil.*		
Total cost first year	£33	6	0
Maintenance annually after first year	22	0	0
Total cost each succeeding year	£55	6	0

My Association are further advised "the additional sum for decorative repairs" cannot be a serious item, as in a public school ceilings

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must be redone each three or five years; and they would further point out that in the use of inverted burners very little discoloration of ceilings occurs. There are, so my Association are informed, other advantages that gas has over electricity as an illuminant; it being well known that it is better for children's eyes, that there is no fear of sudden failure (with the possibility of panic arising thereby), that the gas-light is better distributed, that the circulation of air is better effected, that greater heat accrues for the winter (when it is needed), and that there is no fear of wires fusing and thereby causing a fire. The plea that "the Borough are the owners of the electricity undertaking" is no doubt one to be remembered; but my Association have reason to believe that gas companies are large ratepayers, and, furthermore, pay rates according to the quantities of gas consumed. There is, therefore, in this plea a little of the principle of "rob Peter to pay Paul."

SHUTTING-OFF GAS FROM BUILDINGS IN CASE OF FIRE.

In a recent number "Progressive Age" pointed out that, in case of conflagrations, one of the serious features is the breaking of gas-pipes and escaping gas which will not be quenched by water. This always has been considered a menace, and years ago the use of curb-cocks was quite common. However, non-observance of this precaution is now more the rule; and it seems that the fire departments are agitating the question to some slight extent, and vendors of patented devices to a great extent, with the result that proposals have been made to deal with the trouble both in Kansas City and in New York.

An ordinance has been proposed governing, *inter alia*, the construction and erection, alteration, repair, remodelling, rebuilding, moving, securing, and inspection of buildings and structures in Kansas City, and providing for their safety when so erected, and which proposes (section 269) the compulsory use of some gas combination shut-off and turn-on device. A very similar clause is suggested for New York City (section 89) and may here be quoted:

> "Every building within this city in which gas is used for illuminating, heating, or other purpose, shall be equipped with a mechanical device or devices that will enable any person to shut off or turn on the supply of gas to such building from the outside or vestibule of said building by breaking the glass cover of the shut-off or turn-on keys which operate the gas-valves in the basement. Such device or devices shall be placed at such point or points in or on such building as may be designated by the Chief of the Fire Department of this city, and shall be of such design and construction as to be easily operated by manual power and with reasonable certainty and safety, and to do the work required to be done thereby.
>
> "The device or devices installed under the provisions of this section shall be approved by the Chief of the Fire Department, and shall be so installed as to operate automatically in case of heat from fire. All pull rods or chains must be enclosed in conduits, and at all angles run over axle pulleys and operate with ease.
>
> "After the installation of such device or devices, the control thereof shall be under the supervision of the Chief of the Fire Department.
>
> "Any person who, without written authority from the Chief of the Fire Department, shall meddle or tamper with any such device or devices installed upon any building or buildings under the provisions of this section shall be deemed guilty of a misdemeanour."

Our contemporary adds: This measure has been referred to the Committee on Buildings, and not yet passed upon finally. It probably will not be reported favourably, for it was afterward discovered by its introducer that he was being used by a firm manufacturing a device sold for the purpose the ordinance specified. The ordinance was resisted by the real estate interests. The Kansas City ordinance was passed some time ago against the opposition of the Company. The New York City ordinance was resisted by all but its introducers. When the dangers of such a device were pointed out, the city officials would have nothing to do with it.

PUBLIC ELECTRIC LIGHTING CHARGES AT HASTINGS.

The following criticism upon the above question is made by Mr. Chas. F. Botley, Assoc.M.Inst.C.E.:

In an editorial article in the "Hastings and St. Leonards Observer" for June 18, the remarkable statement is made that "*mainly* owing to the additional revenue through the *extension* of the lighting of the public lamps in the streets," the finances of the Corporation electricity works for last year show an improvement. This is certainly not correct; the improvement being accounted for by the increased charge made to private consumers, and more especially by the increased charge made for public arc lamps. For on July 1 last, when the prices to private consumers were increased, the charge for current to public arc lamps was also increased to 4d. per unit; and thus the revenue contributed by these (for 113 lamps) in 1909 was £2260 and (for 115 lamps) in 1910 £2706—an increase of £446. Less current was sold with the continued adoption of metallic filament lamps to private consumers. But nevertheless an increased revenue of £281 was obtained; and these two increases more than accounted for the increase in the gross profit of £589, which is the best criterion of the success or otherwise of a year's trading, because it is easy to conceive the revenue side might be inflated by most unprofitable business, which would not assist the gross profit which has to be earned to meet the interest and the sinking fund charges. For instance, it would require the sale of an addtional 350,000 units of current at 2d. (the price now obtained for power, and for the converted

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street lamps and half as much again as was sold last year) to make good last year's deficiency, even assuming no increase on the expenditure side, which is, of course, not possible.

The "Observer" points out that last year's loss was £882 less than the loss in the previous year. The figure is correct; but this is absolutely no criterion in the altered conditions of last year, and, indeed, if we go back a year previous, we find that the loss was £2982, against £2919 last year.

The increased charges to private consumers made in July last appear more than justified, because excluding current at 2d., and that sold under contract, the average return per unit sold in the three months at the old price was 4·54d. per unit, whereas the average return in the nine months of the new price is 6·17d. per unit. Indeed, the figure now being obtained from private consumers would soon make the concern self-supporting, but for the fact that current is being sold for public arc lamps at 4d. per unit, and for the converted street lamps (of which the "Observer" thinks so highly) at about 2d. per unit, and to power consumers also at 2d. per unit. Seeing that the average cost per unit sold for generating and distributing electricity for the past year was 2·11d. per unit without management and capital charges, it is fairly obvious that commercially these prices are unremunerative, and cannot be deemed good management.

The following average figures, which are, of course, obtained from an analysis of the accounts, will be of interest; and they are in all cases per unit of current sold.

Total cost including everything	6·74d.
Total cost of working expenses only	3·18
Gross profit—*i.e.*, to meet interest and sinking fund charges	2·60
Loss to be met out of the rates	0·96
Generating and distributing only	2·11
Working expenses less public lamp charges	2·96

Even if some consumers of electricity are so much favoured as to excuse them all the capital charges on the undertaking, it will be seen that, on a business basis, public lighting cannot be charged at less than 2·96d. per unit. The lamps converted at a cost to the ratepayers of £500 or more showed some revenue; but as the return for current was only 2d. per unit, the business must be done at a loss. If these lamps can be supplied at 2d. per unit, why not the new arc lamps on the new Caroline Parade, for the arguments put forward in the one case would apply with equal force to these if commercially sound? But obviously they are not.

The testing of gas-meters at Coventry is undertaken by an official who is also the Inspector of Weights and Measures. The number of meters tested in the last twelve months was 4776, compared with 2499 last year. The income from fees for testing and stamping amounted to £134, as against £75; and the expenditure was £30 10s. 7d., compared with £22—leaving a balance of income over expenditure of £104.

RADCLIFFE ELECTRICITY SUPPLY.

Lancashire Electric Power Company and the Council.

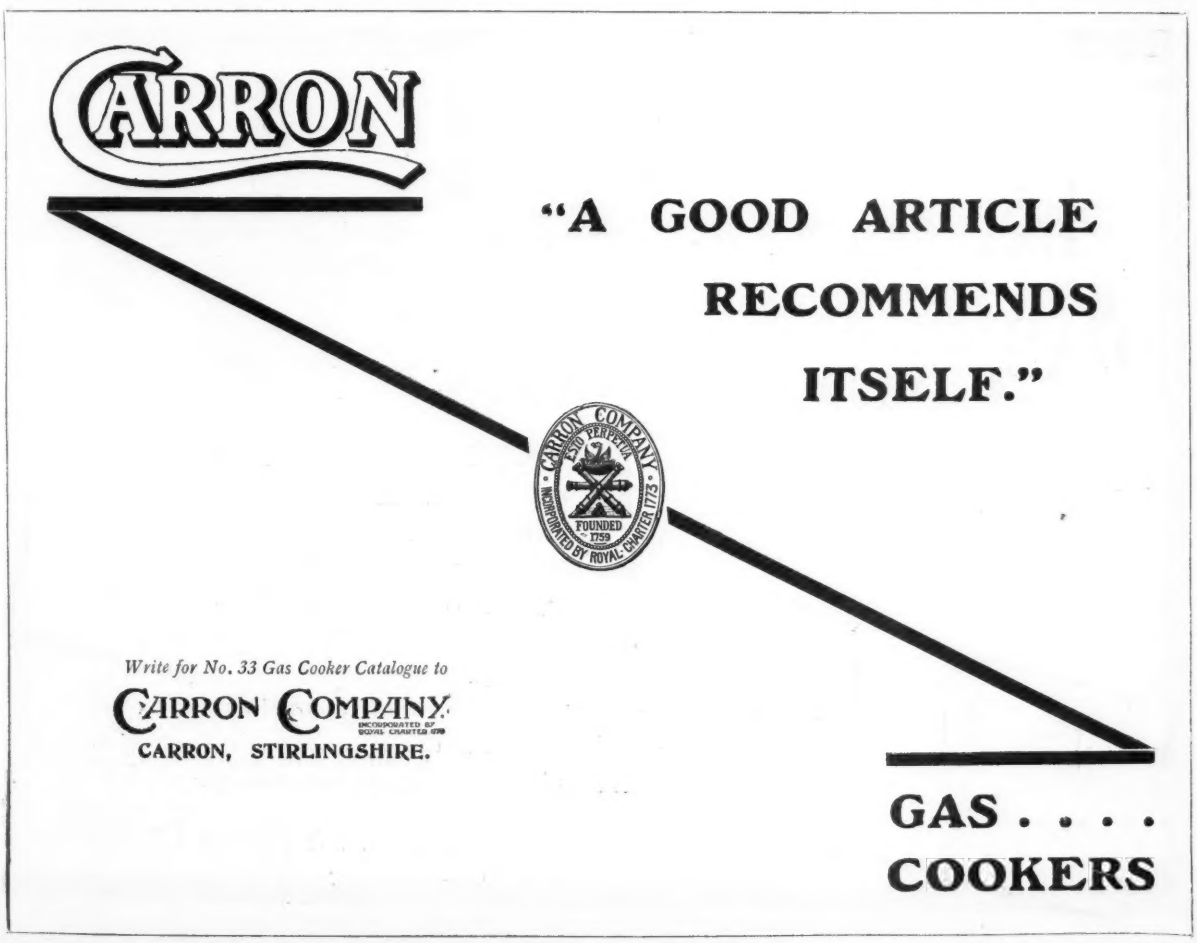
A couple of months ago, there was reported in the "JOURNAL" (*ante*, p. 259) an inquiry which was held at Radcliffe, by Mr. Archibald Read, on behalf of the Board of Trade, as to an application made by the Lancashire Electric Power Company for a Provisional Order to enable them to supply electricity in the area of the Radcliffe Urban District Council. The Council have the monopoly of the supply of electricity in their district; and the Power Company, who erected a generating station just outside the boundary six years ago, sought to deprive them of it. They have latterly made many efforts to supply current in Radcliffe; but the Council have declined to allow them to enter into unrestricted competition with their municipal works. The application was opposed both by the Council and by the Radcliffe and Pilkington Gas Company. The Board of Trade decision has now been given.

The Power Company contended it was to the commercial interest of the town that there should be a large and cheap supply of electricity for motive purposes. The District Council's reply was to the effect that if large supplies were needed, the Council could come to terms with either the Bury Corporation or the Power Company; but in the interest of the ratepayers, the Council ought to maintain their monopoly powers. The decision is in favour of the Council; the Company's application for a Provisional Order having been refused. The Board of Trade, however, say that, from the evidence that was produced at the inquiry, it appears to them the facilities afforded to power users in Radcliffe to obtain a supply of energy at a reasonable rate were inadequate and, in the opinion of the Board, should be promptly extended. In the event of the Company making fresh application for a Provisional Order in respect of the district at some future date, and on it being shown to the Board that the demand for energy for power purposes is not being adequately met, the Board may find it necessary to arrive at a different conclusion from that now conveyed.

SKIPTON WATER SUPPLY.

New Works Inaugurated.

The formal inauguration took place last week at Skipton of a new scheme of water supply which has been carried out at a cost of about £80,000, and for which the Engineers were Messrs. George H. Hill and Sons, and the Contractors Messrs. H. Arnold and Sons, of Doncaster. A large company was entertained at luncheon by Mr. W. Farey, the Chairman of the Skipton Urban District Council; and afterwards Mr. T. Duckett, the Chairman of the Water Committee, invited Mr. Farey to perform the inaugural ceremony of bringing the Embsay Moor reservoir into use, by raising one of the valves in the valve-tower, and



thus allowing the water to flow into the mains. For this purpose, Mr. Farey was presented by Mr. E. P. Hill with a key of the valve-tower; and he at once declared the works open. Mr. W. S. Arnold presented a rose bowl to Mr. Duckett in recognition of his services as Chairman of the Water Committee. This completed the ceremony; and the party subsequently made a tour of inspection of the works, under the guidance of the engineering staff.

The Act was obtained in 1904; and as Skipton at that time was suffering from serious shortage of water, Parliament gave power to the promoters to provide a temporary supply from the new source at the foot of Embsay Moor, about 2 miles from Skipton. It was absolutely necessary that the additional supply should be provided without delay; and as events turned out, the tapping of the springs on the newly-acquired site, and the conveying of the water to Skipton, undoubtedly averted a water famine. The laying of the pipe-track was carried out by administration under the supervision of the late Mr. J. Mallinson, the Town Engineer. In July, 1905, less than a year after the Act was obtained, the Embsay Moor water was first conveyed to Skipton; and since that day all difficulties in the way of supply have vanished. The contract for the construction of the reservoir and the subsidiary works was let in October, 1905; and Mr. C. M. Norrie was appointed Resident Engineer to superintend all the work except the pipe-line. The scheme provides that an excellent supply of water from Whitfield Sike Spring can at all times be carried round the reservoir without being contaminated by the peaty flood water which in rainy seasons comes down freely through the gathering-ground above. By a simple arrangement of valves, the spring water can be sent direct to Skipton at all times; while the flood water is passed on to the reservoir to be stored and purified by settlement. Prior to the construction of the embankment across the valley, it was necessary to divert the stream that runs through the reservoir site. A tunnel was driven through the solid shale beneath the site of the embankment; and by this means the stream was diverted. The raising of the embankment took nearly three years of incessant work. The materials for the puddle embankment were obtained from the inside of the reservoir. In all, there have been used in the construction of the embankment 53,750 cubic yards, or 55,250 tons, of puddled clay, and 204,430 cubic yards, or 245,320 tons, of earth. Under the trench, about 206,260 cubic feet of timber was used for propping up the sides. The surplus water is disposed of by means of a waste weir or overflow on the east side of the valley. This water falls over stone steps, and then enters a long, sloping channel, which ends in the old stream bed in the bottom of the valley below the embankment. The works for the drawing off of the water for Skipton were designed so that the surface water can be taken in preference to the water in the bottom of the reservoir.

Swadlincote Gas Management.—In view of the continued illness of their Gas Manager, Mr. G. B. Smedley, the Gas Committee of the Swadlincote Urban District Council have decided to pay him a yearly sum as Consultant, and advertise for another Manager.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

In the Glasgow Town Council on Thursday, Mr. A. Kennedy asked the Convener of the Gas Committee if he would bring under the notice of his Committee the advisability of installing a carburetted water-gas plant to assist in meeting exceptional and sudden demands for gas, such as were experienced last winter, and would assuredly occur again. Bailie Kirkland stated, on behalf of the Convener, that at Provan there was an installation of oil-gas plant for this purpose; but he would ask the Convener to consider the question of installing a carburetted water-gas plant.

On Monday evening, the Town Council of Carnoustie paid a visit of inspection to the gas-works recently acquired by them. Mr. J. Wynne, the Manager, showed the company over the works. The Gas Convener—ex-Provost Soutar—afterwards entertained the Council and officials in the Municipal Chambers. Provost Walker, who presided, said they had all been much interested in what they had seen that evening. There was no doubt that they had secured a concern up-to-date and complete in character. A pleasing feature of the gas purchase had been the very fine way in which they had been able to carry it through. It had pleased the sellers, and it had pleased the buyers; and it was now their duty, as a Council, to try to do their best to make the thing a success, so that they might justify the confidence of the ratepayers. Ex-Provost Soutar said he was proud, as Convener of the Committee, to have played a part in the taking over of the concern; and it was now for them to see that they worked smoothly and prosperously. There had been three very outstanding transactions since Carnoustie became a burgh—the purchase of the links, the water scheme, and the gas purchase. Their golf course was not to be surpassed; their water arrangement with Dundee was very fortunate; and as for the gas undertaking, although he personally was opposed to it when originally proposed, he was ready to admit now that it would have been better to have taken over the works earlier. Since then, the Company had spent £10,000 on reconstruction. The works were now up-to-date; and the increased consumption would more than pay the outlay. Mr. Wynne said they had doubled the gas concern in seven years; and he hoped that in other seven years they would double it again, and that gas would be very much cheaper than at the present time.

The Town Council of Moffat have resolved, at an estimated cost of £450, to adopt an automatic system of lighting and extinguishing the public lamps. Controllers have already been tried as an experiment, in the lighting of the town clock and some of the lamps in High Street, with satisfactory results. It is calculated that the saving to the burgh by fixing controllers on the whole of the lamps will be about £50 a year. Under the existing arrangements, the average cost per lamp per annum is 17s. 2d.; whereas under the new system it works out at 10s. 4½d. The cost of maintenance and repair is reckoned at 3s. per lamp, as against 5s. 9d. at present. Under the new arrangement, it is

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estimated the annual expenditure will be £154, compared with £195; the former sum including interest as well as the repayment of the loan of £450.

It is doubtless in reference to this announcement that the statement is published in the "Aberdeen Free Press" on Thursday of this week that: "A southern burgh has adopted a system for automatically lighting and extinguishing street lamps, whereby, at an estimated initial cost of £450, about £50 per annum would be saved to the burgh. Mr. Lewis Anderson, the Inspector of Lighting at Aberdeen, states that, on account of the cost of its introduction, a scheme of automatic lighting would be of no benefit to Aberdeen. He pointed out that the cost of lighting was not an item which had to be taken into serious consideration, whereas if automatic lighting were resorted to, meters would have to be installed at each lamp. The initial cost of these meters would be about 30s.; but there were also other matters which had to be considered. He had two automatic meters on trial; and while one worked satisfactorily, the other went wrong frequently. By the other system of lighting direct from the mains, new mains would have to be laid for the purpose, in order to keep private lighting and street lighting separate. If this were not done, when the street lamps were lighted or extinguished the same would also happen with house lamps. Another difficulty would be experienced with regard to mantles, because a man would have to be employed going round the lamps when lighted, in order to see that the mantles were all correct. He considered that the scheme was quite practicable in small towns; but in the case of larger towns, like Aberdeen, it would be of no benefit. Several large towns had tried a scheme of automatic lighting; but in most cases they had had to throw it out." It would be interesting to know in what large towns an automatic system of lighting public lamps had been tried and thrown out. I know of none. The statement which I have quoted is evidently the outcome of an interview with Mr. Lewis Anderson. Mr. Anderson is the Inspector of Lighting, and as such does not necessarily understand everything relating to gas supply. His observations as to separate mains being required—if the interviewer has correctly represented his views—are not intelligent. Very much otherwise. A gas-lamp in a private house, even with a pilot-light, would not, unless fitted with the automatic appliance, be affected by the raising and reducing of the pressure; and so the separate main bogey goes by the board. Had the interviewer taken the opinions of Mr. S. Milne, the Gas Engineer, on the subject, his report, it may be assumed, would have been very different. It is disappointing to have a pronouncement like this made, and especially from Aberdeen, where, about twenty years ago, when the late Mr. A. Smith was Gas Engineer, so much was made of the great saving there was to the community by the fitting-up of Peebles governors in the public lamps. In those days, Aberdeen led the way. To-day, if Mr. Lewis Anderson be taken as the mouthpiece upon lighting problems in Aberdeen, the city has fallen greatly behind. I may be mistaken, but I think the case of Moffat is unique in Scotland, in this respect—that the introduction of automatic lighting of the street lamps is being introduced by a Corporation who do not own the local gas undertaking.

A very good exhibition of the gas cooking and heating appliances of the Carron Company and Messrs. R. & A. Main, Limited, and of the lighting appliances of Messrs. Falk, Stadelmann, and Co., was held in the Falkirk Town Hall this week. It was opened on Monday evening by Mr. W. Wilson, the Gas Engineer to the Corporation of Falkirk. Bailie Bogle, the Convener of the Gas Committee, who arrived later, said the exhibition had been got up by the Carron Company and Messrs. R. & A. Main at the request of the Town Council. The Council had taken the initiative in the matter for two reasons. The first was to help to a larger sale of their gas; and the second was to enable the community of Falkirk, and particularly the female portion of it, to learn how to cook better than they did. It had been a by-word among the nations that, of all countries, unfortunately, their female compatriots of Scotland were the worst cooks in the world. Miss E. M. Dods, late Principal of the Dundee School of Cookery, gave lectures and demonstrations during the week.

There has been a long spell of dry and, of late, very warm, weather in Scotland, which has considerably dried up water sources. Even in Glasgow, with its abundant supply, the pinch has been felt. In the Town Council on Thursday, Bailie Alston asked if it was the case that during the last fortnight the daily consumption of water had risen to 70 million gallons. In some districts of the city there was a scarcity of water. Was this due to waste? Bailie Campbell said the average normal consumption of water in Glasgow was 63 million gallons per day; but during the past fortnight it rose to 70 million gallons. This was due to the very hot weather and to the people using the water recklessly. He hoped the citizens would be more economical, otherwise there must be a scarcity. It meant a severe strain on the reservoirs at Milngavie.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *June* 25.

Sulphate of Ammonia.

The volume of new business during the past week has not been large; but the requirements have nevertheless been sufficient to absorb the present reduced output and to sustain values at the recent level, the closing quotations still being £11 16s. 3d. per ton f.o.b. Hull, £11 17s. 6d. per ton f.o.b. Liverpool, and £11 18s. 9d. per ton f.o.b. Leith. In the forward position, no fresh transactions are reported; the fact of makers having lately advanced their limits 2s. 6d. per ton apparently tending to deter consumers from operating further.

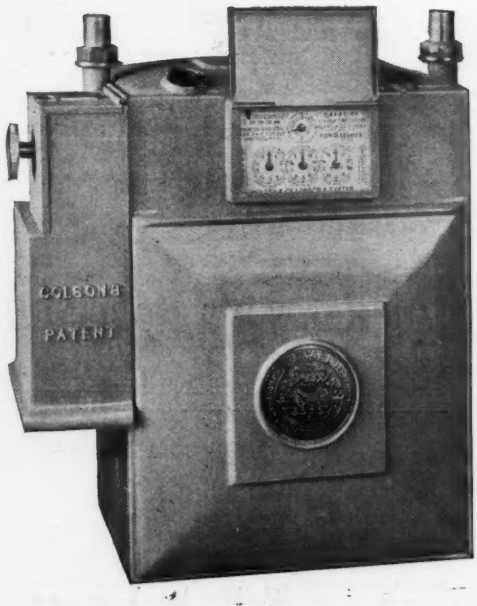
Nitrate of Soda.

The prices of this article remain unchanged at 9s. 4½d. per cwt. for ordinary and 9s. 7½d. per cwt. for refined quality, on spot, and the tone of the market is quiet.

LONDON, *June* 27.

Tar Products.

The markets for tar products have been very dull during the past week, and prices have declined in many instances. In pitch, makers



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do not seem inclined to sell for forward at the reduced prices; but on the other hand, buyers are waiting before making any further purchases, in the hope that they will be able to do better. There has been a decided weakening in benzols, and considerable business has been done at reduced prices. Creosote remains steady. Carbolic acid does not seem of any interest, though in some quarters makers report that they are able to obtain as much as 1s. 0¼d. to 1s. 0⅜d. per gallon for the 60's quality.

The average values during the week were: Tar, 17s. 3d. to 21s. 3d., *ex* works. Pitch, London, 39s. 6d. to 40s.; east coast, 37s. 6d. to 38s. 6d., west coast, 36s. 6d. to 37s. 6d. f.a.s. Mersey ports. Benzol, 90 per cent., casks included, London, 7¼d.; North, 6¼d.; 50-90 per cent., casks included, London, 7⅜d.; North, 7¼d. Toluol, casks included, London, 10d.; North, 9d. to 9¼d. Crude naphtha, in bulk, London, 3¼d. to 3⅜d.; North, 3¼d. to 3⅜d.; solvent naphtha, casks included, London, 1s. 3d.; North, 1s. 2½d. to 1s. 3d.; heavy naphtha, London, 1s. to 1s. 1d.; North, 11d. to 1s. Creosote, in bulk, London, 2¼d. to 2⅜d.; North, 2d. to 2¼d. Heavy oils, in bulk, 2⅜d. to 2⅝d. Carbolic acid, 60 per cent., casks included, east and west coast, 11½d. to 1s. Naphthalene, £4 10s. to £8 10s.; salts, 40s. to 42s. 6d., bags included. Anthracene, "A" quality, 1½d. per unit, packages included and delivered.

Sulphate of Ammonia.

The sulphate market has remained in about the same position; and though there are several inquiries of a fair size, they do not lead to definite business. To-day, actual Beckton is quoted £11 18s. 9d., and outside makes upon Beckton terms at £11 10s. In Hull, £11 13s. 9d. to £11 15s. is quoted; in Liverpool, £11 15s. to £11 16s. 3d.; and Leith, £11 17s. 6d. to £11 18s. 9d. In Middlesbrough, £11 15s. is asked.

COAL TRADE REPORTS.

Northern Coal Trade.

The chief local holidays of the year have since the last report interfered with both the production and the consumption of fuel, though the effect on the prices has not been great. In the steam coal trade, best Northumbrians are quiet at from 10s. to 10s. 3d. per ton f.o.b.; second-class steams are about 9s. 3d. to 9s. 6d., and steam smalls from 5s. 9d. to 6s. 9d. per ton—the output being now fair. In the gas coal trade, there is naturally a limited local consumption; but the exports are fully an average. Durham gas coals vary in price, according to quality; the usual classes being from about 9s. 1½d. to 9s. 10½d. per ton f.o.b., while for Wear specials up to 10s. 6d. is quoted. Among the few contracts reported this week are two for Italy—one for Genoa, at about 16s. 3d. per ton at that port; and the other, of 30,000 tons, delivered over next year, at Venice at about 17s. per ton—both of best Durham gas coal. Other contracts are in the market; and these prices, possibly yielding near 9s. 10d. per ton f.o.b., are expected to rule the market much. Coke is quiet; but gas coke is firm, being in limited make, and with a good export demand. From 13s. 6d. to 14s. per ton f.o.b. seems now to be quoted for good gas coke.

Scotch Coal Trade.

Trade has been more active; ell for shipment being in better request. Splint, with the exception of inferior qualities, is finding a ready market. The prices now quoted are: Ell, 8s. 9d. to 10s. 3d. per ton f.o.b. Glasgow; splint, 9s. 9d. to 10s.; and steam, 9s. to 9s. 3d. The shipments for the week amounted to 341,914 tons—an increase of 30,787 tons upon the previous week, and 3613 tons upon the corresponding week of last year. For the year to date, the total shipments have been 7,279,500 tons—an increase of 667,606 tons upon the corresponding period.

Fylde Water Board Accounts.—The eleventh annual report of the Fylde Water Board shows that the receipts on gross revenue account for the past year amounted to £66,181, as compared with £64,229 in 1909; while the expenditure was £15,349, against £13,778. The gross profit is an increase of £308, as against an increase of £2123 in 1909 over 1908; and the net profits increased by £652, against an increase of £1559 in 1909 over 1908. The diminution in the profit increase is accounted for by special expenditure. The number of consumers supplied by the Board during the year was 28,014, or an increase of 795 over the previous twelve months.

Coventry Water Supply.—The Coventry Corporation have expended during the year £6086 on capital account in respect of their water undertaking—chiefly on works connected with the Birmingham supply—bringing the total expenditure to date to £214,813. The receipts from water-rents amounted to £27,155, an increase of £7140. The total revenue was £29,228. The working expenditure amounted to £14,629, as against £12,100 in the previous year; and the net result was a profit for the year of £5577, whereas twelve months ago it was only £2133. The Engineer (Mr. J. E. Swindlehurst) assures the Water Committee that the department is on a sound working basis.

Birmingham Gas Department Figures.—We have received from Mr. Thomas H. Clare, the City Treasurer of Birmingham, a copy of the detailed accounts prepared by him for the twelve months to March 31. Those relating to the Gas Department furnish some figures in addition to those which were given in the "JOURNAL" for May 17 (p. 449). The revenue account shows a balance of income in excess of expenditure of £189,934 for 1909-10, carried to profit and loss account. After providing for annuities, interest, and redemption of debt, the balance of the profit and loss account was £72,492. The amount of capital expended during the year was £48,278; and the value of buildings and plant abandoned, &c., was £63,636. The total expenditure on capital account to March 31 was £2,460,967. The amount of the reserve fund provided out of revenue, with accumulations, was £100,000; while the gross total of loans negotiated, including annuities, was £2,908,949. The amount provided from revenue for redemption of debt during 1909-10 was £46,661; and the gross amount provided for redemption of debt to the end of the year was £926,095. The balance of loans remaining to be provided for was £1,982,854.

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Hull Water and Gas Supplies.

The Mayor of Hull (Alderman H. Feldman), when presenting the past year's accounts to the Corporation Water and Gas Committee, said he considered the results of both undertakings were eminently satisfactory. It was decided, after some discussion, to consider at the next meeting the question of the advisability of reducing the price of gas in the Old Town. With reference to the gas undertaking, the income was £12,041, and the expenditure £8678; leaving a gross profit of £3363. The net profit is £1063, and the balance on net revenue account amounts to £3722. The usual contributions have been made to the sinking fund, which now stands at £6894. On the reserve fund, there is a credit balance of £4434. No expenditure has been incurred during the year on capital account. On the water undertaking, the report stated the income for the year ended March 31 amounted to £65,317, and the expenditure to £27,951, leaving a gross profit of £37,366. The profit has been applied as follows: Annuity to city fund, £2600; interest charges, £11,638; sinking fund instalments, £1772; income-tax, £939; relief of city fund rates, 1910-11, £12,000; and transferred to reserve fund, £8416. After reserving £12,000 to the relief of rates and transferring £8416 to the reserve fund, the working balance is £9441. The sinking fund now reaches £67,309. On construction account, there is an adverse balance of £5040.

Price of Gas at Haverhill.—The Haverhill Gas Committee, having considered the advisability of lowering the price of gas, recommended that a reduction of 2½d. per 1000 cubic feet be made as from the end of the Midsummer quarter (the slot-meters to be adjusted accordingly), and the contract rate for street lighting to be reduced 1s. 5d. per lamp per annum. They also intimated that, provided the new plant continued to work satisfactorily during the ensuing twelve months, they expected to be in a position to make a substantial reduction in the price of gas next year. The condition of affairs thus revealed was regarded as eminently satisfactory by members of the Urban District Council; and the recommendation was agreed to.

Electric Light Failure at Wrexham.—Last Saturday week (it is so often on a Saturday that these occurrences are experienced!) much inconvenience was caused to shopkeepers and others in Wrexham, by the failure of the electric light, caused by a cable fusing. Great trouble was experienced by those unwise tradesmen who had entirely dispensed with gas-fittings; for the failure occurred just when business was very brisk. Most serious of all, however, was the loss sustained by the places of entertainment. At a cinematograph entertainment, the audience, numbering nearly 1000 persons, were informed that it would be impossible to give the usual display; and their money was returned. In many shops and licensed houses, business was conducted by the aid of candles.

Progress of the Portsea Island Gas Company.—By the death at Portsmouth, on the 20th inst., of Mr. Edmund Chiverton, at the age of 76, the progress of the Portsea Island Gaslight Company is recalled. Mr. Chiverton, who originally was employed by the Portsmouth Water-Works Company for three years, became Surveyor of Mains to the Gas Company in 1861, at which period the largest of their three gasholders was for 600,000 cubic feet—having been erected three years previously. The deceased superintended the substitution of a 24-inch main for a 7-inch one, and when public lighting came into vogue in 1865, he had the 780 lamps under his control. He also superintended the relaying of all the mains when the new holder at Rudmore for 1¼ million cubic feet was erected in 1873. During the period of his surveyorship, it is estimated he superintended the laying of 92,800 yards of mains.

East Surrey Water Company.—In their report for the year ended March 25, the Directors state that they have debited the renewal and contingency fund with £1764, this amount having been expended in the year upon the completion of alterations necessary at the Caterham works for the conversion of these into a reservoir, and have placed £2000 to the credit of the fund out of the balance of profits. The fund therefore now stands at £11,937. The profit for the year is £27,481, which, with the balance of £3651 brought forward, makes £31,132. Out of this, the Directors recommend dividends for the year of 5 per cent. upon the preference shares, 7 per cent. upon the ordinary "B" shares, and 10 per cent. upon the original ordinary "A" shares (less income-tax in all cases). This will leave a balance of £4133 to be carried forward. During the year, 463 new customers were added; and about 2½ miles of new mains were laid.

Stamford Public Lighting.—At a recent special meeting, the Stamford Town Council considered a recommendation of the Lighting Sub-Committee that a contract should be entered into with the Gas Company for the public lighting for a period of five years, and that no contract be entered into with the Electric Supply Company. It seems that the latter Company have at the present time five large arc lamps in the main streets; and that a great number of complaints had been received with regard to these. The Deputy-Mayor (Mr. T. S. Duncomb) pointed out that the Committee had decided to go back to the gas-lighting system, with a greater distribution of lamps, and a saving to the borough of £42 a year. The recommendation was adopted, with an amendment to the effect that the Gas Company should be interviewed with a view to securing the same terms for a three-year contract as the Company offered for a term of five years.

The Leicester Vacancy.—Referring to the vacancy which has unhappily been created at Leicester by the death of Mr. Alfred Colson, the "Nottingham Daily Express" says: Following the death of the Leicester Corporation Gas Engineer, the Gas and Electric Lighting Committee of that town have decided to recommend the Council to obtain a new Engineer and Manager for the Gas Department. Up to the present, gas and electricity have been under one Manager; and the general opinion in Leicester is that the time is opportune for separating the two departments so far as managerial control is concerned. The action of the Committee is regarded as an indication that the separation policy has been decided upon. The question of the management of the Electric Lighting Department, however, remains in abeyance, pending expert advice as to the desirability and feasibility of running the two electrical stations under one control.

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Birmingham Water Supply.—In his epitome of the accounts for the year to March 31, Mr. T. H. Clare, the City Treasurer of Birmingham, says the revenue account of the water undertaking for 1909-10 shows a balance of income in excess of expenditure of £205,022, carried to profit and loss account. The profit and loss account shows a loss of £81,059, which has been provided for as follows: Contribution from the borough rate, £65,000; a transfer from capital under section 22 of the Birmingham Corporation Water Act, 1902, £11,236; balance carried forward, £4823. The amount of capital expended during the year under the 1892 Act was £52,507. The total expenditure on capital account to March 31 under the 1875 and 1879 Acts, was £2,094,260; and under the Act of 1892, £6,205,569. The gross amount of loans negotiated, including annuities, under the 1875 and 1879 Acts, was £2,097,860; and under the 1892 Act, £6,212,500. The amount provided from revenue for redemption of debt during the year, under the 1875 and 1879 Acts, was £17,322; and under the 1892 Act, £3579. The gross amount provided for redemption of debt to the end of 1909-10, under the 1875 and 1879 Acts and the 1892 Act was £241,540. The balance of loans remaining to be provided for, under the 1875 and 1879 Acts, was £1,889,284; and under the 1892 Act, £6,179,536.

Coventry Gas Supply.—The extensive use of prepayment meters in the consumption of gas at Coventry is shown by the fact that during the year ended March 31 last 188,622,100 cubic feet out of a total gas consumption of 808,840,700 cubic feet were consumed in this way. The price of gas varied within the municipal boundary of Coventry from 1s. 9d. to 2s. 5d. per 1000 cubic feet; while in the outside area it ranged from 2s. 6d. to 2s. 11d. The undertaking is now beginning to experience the benefit of the more economical methods of working which it is possible to follow at the new works. The transfer, however, involved considerable extra pressure upon the staff of the department; and the Gas Committee think it is right that this should be recognized financially. They are therefore including among their recommendations a proposal that a bonus should be paid to employees.

The Pulsometer Engineering Company have moved their London offices to Broad Sanctuary Chambers (opposite Caxton House), Westminster—formerly the offices of Messrs. Easton and Anderson.

The [Richmond Gas Stove and Meter Company, Limited, have declared interim dividends for the six months ending June 30 at the rate of 6 per cent. per annum on the preference shares and at the rate of 10 per cent. (free of income-tax) on the ordinary shares.

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EUROPEAN GAS COMPANY. London Offices, July 12, Two o'clock.

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MANCHESTER GAS DEPARTMENT. Tenders by July 7.

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THE GAS LIGHTING IMPROVEMENT CO., LTD.,
7, BISHOPSGATE STREET WITHOUT,
LONDON, E.C.
Telegraphic Address: "Carburine, London."

KRAMERS AND AARTS WATER-GAS PLANT.
K. & A. WATER-GAS COMPANY, LTD.
89, VICTORIA STREET, S.W.

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Thornhill, DEWSBURY.

OXIDE OF IRON.
(NATURAL.)
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT.
PAINT FOR GAS-WORKS.
BALE & CHURCH,
5, CROOKED LANE, LONDON, E.

SULPHURIC ACID.
SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.
with which is amalgamated WM. PEARCE & SONS, LTD.
86, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341 AVENUE.

F. BOYALL, Contractor for Painting GASHOLDERS, OIL-TANKS, ROOFS, and all kinds of LOFT and other PAINT WORK.
70, Balcorne Street, Well Street, HACKNEY, N.E.

SULPHURIC ACID.
SPECIALLY prepared for Sulphate of AMMONIA Makers by
CHANCE AND HUNT, LIMITED,
Works: OLDBURY, WEDNESBURY, AND STAFFORD.
Address Correspondence and Inquiries to OLDBURY, WORCS.
Telegrams: "CHEMICALS, OLDBURY."

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no back Pressure.
The Cheapest in the Market.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, Rose Mount Iron-Works, Elland.

AMMONIACAL Liquor wanted. Chance and Hunt, Ltd., Chemical Manufacturers, Oldbury, Worcs. Telegrams: "Chemicals."

GAS TAR wanted, Brotherton and Co., Ltd., Tar Distillers. Works: Birmingham, Glasgow, Leeds, Liverpool, Sunderland, and Wakefield.

TAR WANTED.
Telephone: Central Manchester, 7002.
Telegrams: "UPRIGHT."
Apply, THOMAS HORROCKS,
Albert Chemical Works, BRADFORD,
MANCHESTER.
Pitch, Creosote, Brick and Fuel Oils, Benzol, Solvent Naphtha, Carbolic, Sulphate of Ammonia.

J. E. C. LORD, Ship Canal Tar Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

BRISTOL RECORDING GAUGES AND THERMOMETERS.
J. W. & C. J. PHILLIPS, 28, College Hill, London, E.C., and 25, Bridge End, Leeds.

AMMONIA. Consumers in any form are invited to correspond with Chance and Hunt, Ltd., Chemical Manufacturers, Oldbury, Worcs.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia. Brotherton and Co., Ltd., Chemical Manufacturers, Works: Birmingham, Leeds, Sunderland, and Wakefield.

"GAZINE" (Registered in England and Abroad). A radical Solvent and Preventative of Naphthalene Deposits, and for the Automatic Cleaning of Mains and Services.
It is also used for the enrichment of Gas.
Manufactured and supplied by C. Bourne, West Moor Chemical Works, Killingworth, or through his Agent, F. J. Nicol, Pilgrim House, Newcastle-on-Tyne.
Telegrams: "Doric," Newcastle-on-Tyne. National Telephone No. 2497.

AMMONIA Waste Liquor Disposal. Purification Plant.
Results Guaranteed. No Working Costs.
John Radcliffe, Chemical Engineer, East Barnet.

R. & G. HISLOP,
GAS ENGINEERS, RETORT BUILDERS, CONTRACTORS, &c.
RETORT SETTINGS, COAL-TESTING PLANT, BOILER FIRING.
Communications should be addressed to Underwood House, PAISLEY.

SPENCER'S PATENT HURDLE GRIDS.
THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, June 21, p. 914.

FIDDES-ALDRIDGE
SIMULTANEOUS Discharging-Charger. The one Machine which Discharges and Charges at One Stroke.
See Advertisement, June 21, p. IV. of Centre.
ALDRIDGE AND RANKEN,
39, Victoria Street, Westminster, S.W.
Telegrams: "Motorpathy, London." Telephone: 5118 Westminster.

IT is Worth Your While to Buy Direct. The RELIANCE LUBRICATING OIL COMPANY supply the best value in NON-CORROSIVE LUBRICANTS—viz., Motor Waggon Oil, 1s.; Motor Car Oil, 2s.; Engine, Cylinder, and Machinery Oils, 1s.; Axle Oil, 10½d.; Exhauster Oil, 10d.; Special Cylinder Oil, 1s. 4d.; 650 T Cylinder, 2s.; Special Engine Oil, 1s. 4d.; Gas Engine and Oil Engine Oil, 1s. 6d.; Refrigerator, 1s. 9d.; Renown Engine Oil, 11½d.; and Astral Disinfectant, 2s. 6d. per gallon. Barrels free, carriage paid. Solidified Oil, 25s. cwt.
The Reliance Lubricating Oil Company, 19 & 20, Water Lane, Tower Street, London, E.C.

EDGAR OF HAMMERSMITH
FOR
AUTOMATIC GAS FLASHING SIGNS.
Blenheim Works, London, W.
Telegrams: "Gasoso London." Telephone: 14 Hammersmith.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the *best*. Satisfaction Guaranteed.

GAS OILS.
MEADE-KING, ROBINSON, & CO. Represent the Strongest Independent Refineries in America; also Petroleum Spirit for Gas Enrichment. 18, Exchange Street, Manchester, and 11, Old Hall Street, Liverpool.

APPOINTMENTS.—Ambitious Men of Parts invited to write—
HERBERT GREATOREX,
APPLICATION SPECIALIST,
BEECHWOOD, MATLOCK.
Specimen of many results:—
"Have got the job. Quite a good start. To you the credit is due, and I think your fee the best Investment I ever made."
BUSINESS IS REVIVING. WRITE NOW.

THE Numerous Applicants for the Appointment of "DRAUGHTSMAN FOR CANADA," which was advertised in the "JOURNAL" on May 24, last, under No. 5242, are Hereby THANKED, and Informed that the APPOINTMENT HAS NOW BEEN MADE.

WANTED, for a 100 Million Works, an ASSISTANT GAS MANAGER. Must be Technically Qualified.
Applicants are requested to give full Particulars of their Training and Qualifications, and to send *Copies* of not more than Three recent Testimonials, to No. 5256, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

GAS Company in the Eastern Counties requires the Services of a Young Man as CANVASSER. Applicants must be Capable of Advising Consumers as to the most modern methods of using Gas for Lighting, Heating, and Power.
Apply, by letter, stating Age, Experience, and Salary required to No. 5257, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

SWADLINCOTE DISTRICT URBAN DISTRICT COUNCIL.

THE above Council invite Applications for the Position of MANAGER (under a Consulting Engineer) of the Council Gas-Works.
The Annual Make of Gas approximates about 47,000,000 Cubic Feet.
The Salary offered is £150 per Annum; and the Appointment will be terminable on Three Months' Notice from either side.
The age of Applicants must not exceed 35 Years.
Applications, stating Age, Experience, and present Position, and accompanied by *copies* of not more than Three recent Testimonials, to be addressed to me, endorsed "Gas-Works Manager," so as to reach me not later than Twelve Noon on Tuesday, the 12th of July, 1910.

W. A. Musson,
Clerk to the Council.
Council Offices,
Swadlincote.

GASHOLDERS—Splendid 45 feet dia- meter and New STEEL TANK, fixed Complete to Plan and Specification; also 14 feet and 16 feet Diameter GASHOLDERS, with STEEL TANKS. Can be seen temporarily erected. Re-erected Cheap for immediate Sale.
Firth Blakeleys, Thornhill, Dewsbury.

RADCLIFFE AND PILKINGTON GAS COMPANY.
TO TAR DISTILLERS.

THE Directors of this Company invite TENDERS for the Purchase of 1080 Tons of the Surplus TAR to be produced at their Works in Radcliffe during the ensuing Twelve Months.
Particulars may be obtained from the undersigned, to whom Tenders must be delivered not later than Tuesday, the 5th of July.

James Braddock,
Manager and Secretary.
Gas Offices, Radcliffe,
Manchester, June 24, 1910.

BOROUGH OF CONGLETON.
(Gas Department.)

THE Gas Committee invite Tenders for the Purchase of Surplus TAR and AMMONIACAL LIQUOR for the Twelve Months ending June 30, 1911.
Forms of Tender and Conditions may be obtained from the undersigned.
Tenders, endorsed "Tar and Liquor," to be delivered at the Office of E. A. Plant, Esq., Town Clerk, Congleton, on or before Saturday, July 2, 1910.
The Committee do not bind themselves to accept the highest or any Tender.

Joseph T. Broughton,
Engineer and Manager.
Gas-Works, Congleton,
June 13, 1910.

COUNTY BOROUGH OF BURY.

THE Corporation of Bury are prepared to receive TENDERS for the Supply of about
40,000 Tons of GAS COAL,
900 Tons of BOILER SLACK,
400 Tons of BURGY,
300 Tons of HOUSE COAL.
Forms of Tender and Conditions may be obtained on Application to Mr. H. Simmonds, Engineer and General Manager, Gas-Works, Bury.
Tenders to be delivered to the Town Clerk, Bury, not later than Friday, July 8, 1910.

BOROUGH OF ILKESTON.
(Gas Department.)

THE Gas Committee invite Tenders for 11,000 Tons of Screened GAS NUTS or PEAS to be delivered at their Siding on the Midland Railway, as required for the Year ending July 31, 1911.
Sealed Tenders, endorsed "Tenders," on Forms to be had on Application to the undersigned, to be delivered to Wright Lissett, Esq., Town Clerk, Ilkeston, before July 6.
The Committee reserve the right to divide the Quantities offered and do not pledge themselves to accept the lowest or any Tender.

F. C. Humphrys,
Engineer and Manager.
Gas-Works, Ilkeston,
June 17, 1910.

EXMOUTH GAS COMPANY.

THE Directors of the Exmouth Gas Company invite TENDERS for the Supply of about 6000 Tons of Best GAS COAL (Screened or Unscreened), to be Delivered in such Quantities and at such times as may be required from the 1st of August, 1910, to the 31st of August, 1911, and to weigh 20 cwt. to the Ton over the Gas Company's or Dock Company's Weighbridge, the Coal to be Fresh Wrought, Dry, and free from Hards, Smudge, Shale, and Pyrites.
Tenders to be accompanied by Practical Working Analysis.
Prices may be quoted c.i.f. or f.o.b. (by Sailing Vessels only) Exmouth Docks, or f.o.r. Exmouth Railway Station (London & South Western Railway).
Sealed Tenders, endorsed "Tender for Coal," to be sent to the undersigned not later than Monday, the 4th of July, 1910,
The Directors do not bind themselves to accept the lowest or any Tender.
Special Tender Forms are not provided or required.

James T. Foster,
Secretary and Manager.
Gas-Works, Exmouth,
June 6, 1910.

COAL WANTED.

THE Urban District Council of Bangor (County Down) invite TENDERS for Supplying about 3500 Tons of Best Screened COAL, to be Delivered and Trimmed into Coal-Store at the Gas-Works, Bangor, at such times and in such Quantities, of about 250 Tons, as may be required, from the 1st of August next.
Deliveries of Coal into the Works will only be received between the hours of 6 a.m. and 11 p.m.
Persons tendering to name the pit from which the Coal offered is raised.
Tenders should be accompanied by Analyses, placed in sealed envelopes, marked "Tender for Coal," and must reach me not later than Monday, the 18th of July, 1910.
No Tender Forms issued.
Any further Particulars can be had from the Gas Manager, Mr. B. Mitchell.
The Council do not bind themselves to accept the lowest or any Tender, and will require security for the due and faithful performance of the Contract.

By order,
J. Milliken,
Clerk to the Council.
Town Hall, Bangor,
Co. Down. June 24, 1910.

MANCHESTER CORPORATION GAS-WORKS.
TENDERS FOR COAL AND NUTS.

THE Gas Committee of the Corporation of Manchester are prepared to receive TENDERS for the Supply of their requirements of Screened COAL and Screened NUTS (Unwashed) during One or Two Years at their Gaythorn, Rochdale Road, Bradford Road, and Droylsden Works, delivery to commence on the 1st day of October, 1910.
The Tender must state at what Colliery the Material offered is raised, and give the size of the mesh of the Screen over which it is passed, with the angle of inclination of the Screen.
Printed Forms of Tender may be obtained on Application (in writing only) to Mr. Fredk. A. Price, Superintendent, Gas Department, Town Hall, Manchester; and Tenders, endorsed "Tender for Coal or Nuts," as the case may be, must be delivered at the Gas Department, Town Hall, Manchester, before Ten o'clock on Thursday morning, the 7th of July, addressed to the Chairman of the Gas Committee.
The Gas Committee do not bind themselves to accept any Tender, and reserve to themselves the right to divide any offer as they may deem advisable.

By order,
Thomas Hudson,
Town Clerk.
Town Hall, Manchester,
June 24, 1910.

PATENT.

THE Proprietor of the British Patent No. 10,616/05 for "IMPROVEMENTS IN MEANS FOR GENERATING AND USING HYDRO-CARBON VAPOURS FOR HEATING AND LIGHTING PURPOSES" desires to sell his Patent or to Grant Licences thereof.
All Communications should be addressed, in the first instance, to L. Duvinage, Patent Agent, 10, Avenue des Nerviens, Brussels.

EUROPEAN GAS COMPANY, LIMITED.

NOTICE is Hereby Given, that the ANNUAL GENERAL MEETING of the Shareholders will be held on Tuesday, the 12th day of July next, at Two p.m. precisely, at the Offices, Finsbury House, Blomfield Street, London, pursuant to the Regulations of the Company.

The Directors who retire by rotation are H. E. Jones, Esq., M.Inst.C.E., and R. S. Gardiner, Esq.; and the retiring Auditors are J. Reeson, Esq., and H. J. Luff, Esq., who, being eligible for re-election, offer themselves accordingly.

The Directors, pursuant to the regulations of the Company, have appointed W. Williams, Esq., to a seat on the Board as Managing-Director; and his Election as a Director will be submitted for confirmation to the Shareholders at the General Meeting.

N. E. B. Garey, Esq., having resigned his seat on the Board, the Directors, pursuant to the regulations of the Company, have filled up the vacancy, and have nominated A. T. Eastman, Esq., as a Director, subject to confirmation by the Shareholders at the General Meeting.

The Accounts to be submitted to the Shareholders will be open for inspection at the Company's Offices on and after the 4th of July next.

NOTICE IS ALSO GIVEN, that the TRANSFER BOOKS WILL BE CLOSED from the 9th to the 29th of July next, both days inclusive.

By order of the Board,
W. B. BRADY,
Secretary.

Finsbury House, Blomfield Street,
London, E.C., June 24, 1910.

In accordance with Clause 12 of the Company's regulations "The bearer of a Share Warrant may, on depositing his Warrant at the Chief Office of the Company in London not later than 48 hours before holding any meeting of the Company, be present and vote at any such meeting in respect of the Shares or Stock included in such Warrant."

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to MESSRS. A. & W. RICHARDS, at 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
BARNET DISTRICT GAS AND WATER COMPANY.

NEW ISSUE OF £10,000 "D" CAPITAL WATER STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, July 12, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Executors of SOLOMON BLAIBERG, Esq., deed.

GAS AND WATER STOCKS AND SHARES,
IN THE
SOUTHEND GAS COMPANY,
SOUTHEND WATER-WORKS COMPANY,
LOWESTOFT WATER AND GAS COMPANY.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, July 12, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

TONBRIDGE GAS COMPANY.

NEW ISSUE OF £1000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

THE Directors of the above Company give Notice that they will be prepared to receive not later than Twelve o'clock Noon on Saturday, the 16th of July, 1910, sealed Tenders for £1000 FOUR PER CENT. DEBENTURE STOCK, in Lots of £10 each, or multiples of £10.

Minimum Price, £100 per £100 Stock.

Full Particulars and Forms of Tender may be obtained from the undersigned.

JAMES DONALDSON,
Secretary and Engineer.

Offices: 109, High Street,
Tonbridge.

THE GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of this Company, so far as they relate to CAPITAL STOCKS, WILL BE CLOSED at Four o'clock p.m., on Tuesday, the 5th day of July next, and WILL BE RE-OPENED immediately after the Half-Yearly Ordinary General Meeting of the Company to be held on Friday, the 5th day of August next.

By order,
HENRY RAYNER,
Secretary.

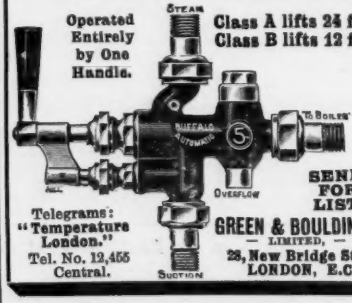
Chief Office: Horseferry Road,
Westminster, S.W., June 23, 1910.

TROTTER, HAINES, & CORBETT, LIMITED,
BRETTELL'S ESTATE,
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: E. C. BROWN & Co.,
LEADENHALL CHAMBERS, 4, ST. MARY AXE, E.C.

'BUFFALO' INJECTOR



Operated Entirely by One Handle.
Class A lifts 24 ft.
Class B lifts 12 ft.
SEND FOR LIST.
Telegrams: "Temperature London." Tel. No. 12,455 Central.
GREEN & BOULDING, — LIMITED, —
28, New Bridge St., LONDON, E.C.

HEATHCOTE GAS COAL
from the
GRASSMOOR COLLIERIES,
CHESTERFIELD.

Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

THOMAS TURTON AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.
London Office:
90, CANNON STREET E.C.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.
Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.
Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

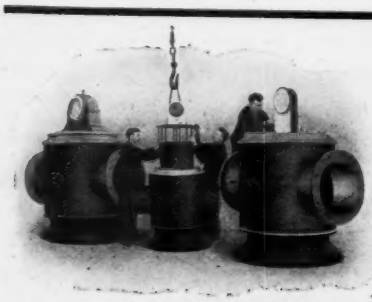
MIRFIELD GAS COAL.
UNEQUALLED.
Sperm Value 878·85 lbs. per Ton.

Please apply for Price, Analyses, and Report, to the
MIRFIELD COLLIERY COMPANY,
RAVENSTHORPE, NEAR DEWSBURY.
LONDON: 16, Park Village East, N.W.

JOHN HALL & CO. OF STOURBRIDGE,
LIMITED,
STOURBRIDGE,
Manufacturers of
FIRE-BRICKS, LUMPS, TILES,
GAS RETORTS,
And every description of Fire-Clay Goods.
RETORTS CAREFULLY PACKED FOR SHIPMENT.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
NEWTONGRANGE, MIDLOTHIAN.

LUX'S
PURIFYING MATERIAL
This Material is now successfully used and highly appreciated in many Gas-Works in England and Scotland.
FRIEDRICH LUX
Ludwigshafen-am-Rhein
[*Sole Agents for England, Ireland, Wales, and Colonies:*
T. DUXBURY & CO.
6, Grosvenor Chambers, MANCHESTER
Telegrams: "DARWINIAN, MANCHESTER"
Telephone 1806 City
"DUXBURYITE, LONDON" Telephone 4026 City.
Sole Agent for Scotland:
DANIEL MACFIE
1, North Saint Andrew Street, EDINBURGH
Telegrams: "GASLUX, EDINBURGH"
Descriptive Pamphlet on Application.



OVER 600 ROTARY Station Meters IN COMMISSION.
Particulars from—
T. G. MARSH,
28, Deansgate,
MANCHESTER.

ADDITIONAL REVENUE FOR GAS-WORKS.
COKE SELLING . . AT 11/6 A TON
COALEXLD SELLING AT 20/- A TON
IN THE SAME TOWN.
X
COALEXLD, LIMITED.
LANCASTER.

GRAETZIN LIGHT

Important Improvements.

BURNERS.

1. **20-Candle Power more light** without increase in the consumption of gas.
2. **Patent Gas Adjuster;** cannot get out of order.
3. **Automatic Gas Regulator,** ensures a constant and unvarying pressure of 35 mm., guarantees a steady light, at the same time obviating waste of gas and blackening of the burner.
4. **Accurate Regulation of the Air Supply.**
5. Burners will be supplied either with Gas Adjuster or Automatic Gas Regulator.
6. The brass casing is heatproof, and, it occasionally cleaned with warm water, will not become discoloured.

LAMPS.

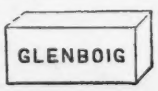
From Lamps with more than one burner, the injectors can be removed from the outside, without taking the lamps to pieces.

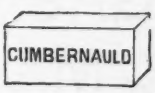
THE GLENBOIG UNION FIRE-CLAY CO., LTD.

GLENBOIG FIRE-BRICKS AND GAS-RETORTS.

Every Genuine Glenboig Brick, Block, Gas-Retort, &c., is legibly stamped with one or other of the Glenboig Company's Registered Trade Marks, as here shown.

TRADE MARKS.





The Glenboig Trade Marks are imitated, and the Glenboig Name unfairly used by Makers of a lower Class of Goods, which, when sold under their own name, command much lower prices.
The Genuine Brand, Stamped on the Goods, is the only Reliable Guarantee to the Purchaser.

GAS-RETORTS, FIRE-BRICKS, BLOCKS, &c., &c.

The SPECIAL BRICKS used in the Construction of Gas Furnaces for Heating Retorts.

Works: GLENBOIG, LANARKSHIRE.
Offices: 48, West Regent St., Glasgow.

56 Prize Medals and Diplomas of Honour.
Highest Award wherever exhibited.

The GLENBOIG BRICKS, BLOCKS, AND RETORTS combine, in the highest degree, the qualities of not melting, and not splitting, when subjected to the highest heats and most sudden changes of temperature, and are, in consequence, found to be economical, even in districts where the local bricks can be had at half the price.

Undernoted we give a Table of Analysis and Physical Characteristics of a sample of Glenboig Fire-Clay by J. T. Norman, London; and, in submitting a report from a responsible and reliable public analyst, we would here draw attention to the unreliable character of some recently published analyses where a manufacturer selects not only his own samples, but also those of his competitor, and has them treated by a private analyst. SUCH STATEMENTS ARE ALTOGETHER UNTRUSTWORTHY.

ANALYSIS OF GLENBOIG FIRE-CLAY.

By JOHN T. NORMAN, Esq., F.C.S., &c., The City Central Laboratory, LONDON.

THE GLENBOIG UNION FIRE-CLAY CO., LTD., GLENBOIG, SCOTLAND.

23, Leadenhall Street,
London, E.C., September 21st, 1909.

Dear Sirs,

I have completed the investigation of the samples of Clay received from you on the 10th inst., and now beg to report the results.

CHEMICAL ANALYSIS.

	Raw.	Fired.
Silica, free	3·03	3·49
Silica, combined	43·20	49·77
Alumina	36·55	42·10
Ferric oxide	1·80	2·08
Titanic oxide	1·80	1·50
Lime	trace	trace
Magnesia	trace	trace
Alkaline oxides	trace	trace
Sulphates as trioxides	0·92	1·06
Loss on Ignition	13·20	—
	100·00	100·00

PHYSICAL RESULTS.

Density	2·65
Volume weight	1·90
Porosity	15·4 %
Linear shrinkage at 100° C.	3·70%
" " " 1050° C.	4·76%
" " Total	8·46%
Volume shrinkage at 100° C.	10·7 %
" " " 1050° C.	12·6 %
" " Total	23·3 %
Plasticity	20·0 %
Fire Stability	1850° C. equiv. 3362° F.

(SEGER CONE 36.) (New Scale CONE 38.)

(Signed) J. T. NORMAN.

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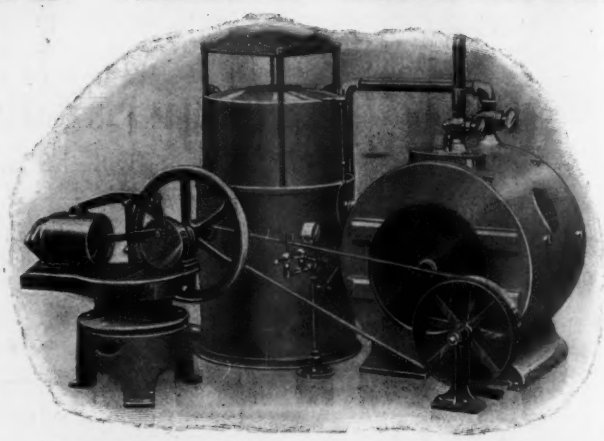

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Inverted Arc Lamp, Fig. 623.

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For Exterior Lighting.

Welsbach-Kern
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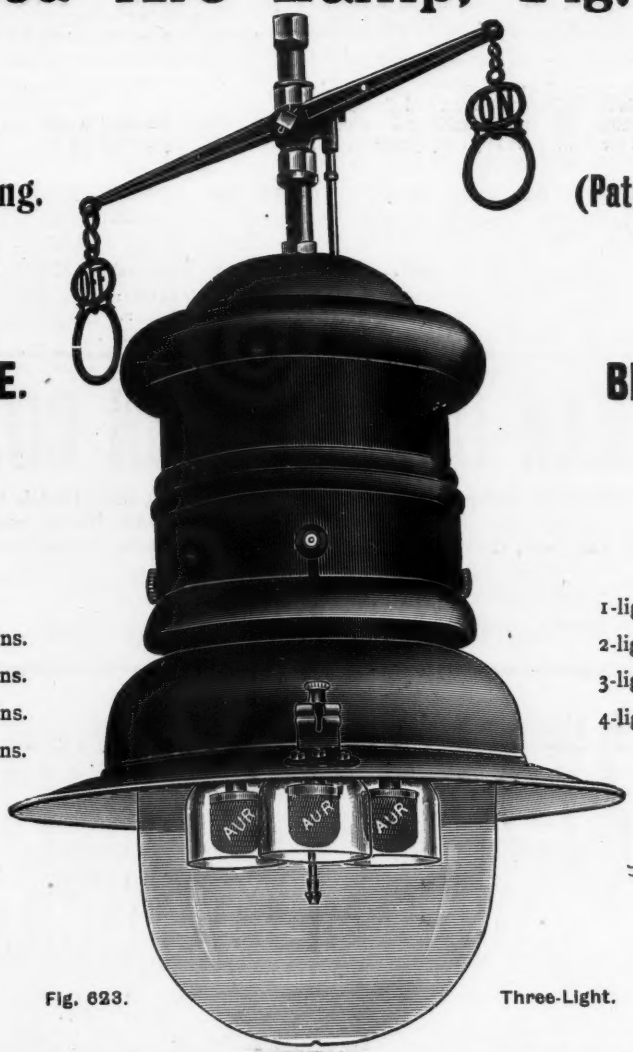

Fig. 623. Three-Light.

Height over all.

1-light . . .	1 ft. 8 ins.
2-light . . .	2 ft. 4 ins.
3-light . . .	2 ft. 4 ins.
4-light . . .	2 ft. 7 ins.

Width over all.

1-light . . .	1 ft. 1 in.
2-light . . .	1 ft. 5 ins.
3-light . . .	1 ft. 5 ins.
4-light . . .	1 ft. 8 ins.

ENAMELLED Green Steel Casing, fitted with Welsbach-Kern Inverted Burners, Gas and Air Regulators operated from outside. Sliding Door to give access to Burners for cleaning purposes. Fitted with Magnesia Nozzles, Welsbach Mantles, and Glass Mantle Protectors. Complete as shown. Highly efficient and regenerative.

	Gas per hour.	*C.P.*	*Steel.*	*Copper Case.*		*Gas per hour.*	*C.P.*	*Steel.*	*Copper Case.*
1-light	4 feet	125	**30/-**	**5/-** extra.	3-light	12 feet	400	**52/6**	**6/-** extra.
2-light	8 feet	260	**47/6**	**6/-** extra.	4-light	16 feet	550	**72/6**	**9/-** extra.

All on or off, or One light on and the rest off, **7/6** per Lamp extra. Cup and Ball, **3/6** per Lamp extra.

RENEWALS.

Glass Mantle Protectors (Fig. 623) **3/4½** per dozen, or in case lots of 5 gross, **33/-** per gross.

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Clear Glass Globes, each	**2/3**	**5/9**	**5/9**	**9/-**
„ „ „ In Case lots per dozen.	**19/6**	**57/9**	**57/9**	**93/-**
Case contains . .	*80*	*18*	*18*	*12*

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Wired Globes, extra each	**2/-**	**2/-**	**2/9**	**3/6**
Parabolic Reflector, extra „	**3/6**	**6/-**	**7/6**	Not made

Welsbach Mantles, each **6d.** subject as usual.

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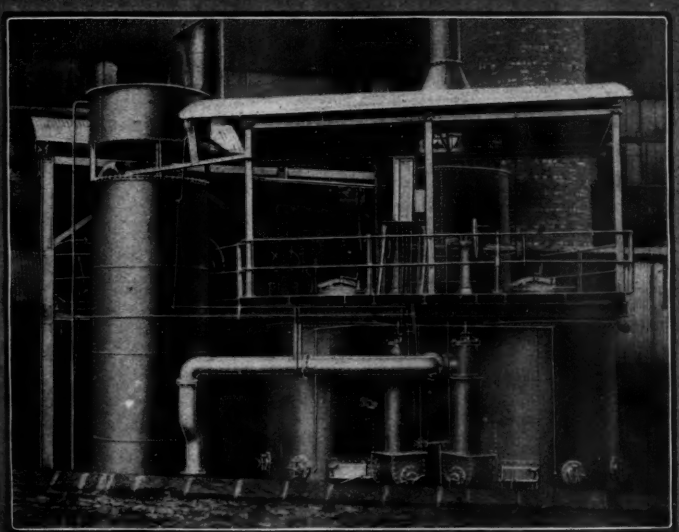

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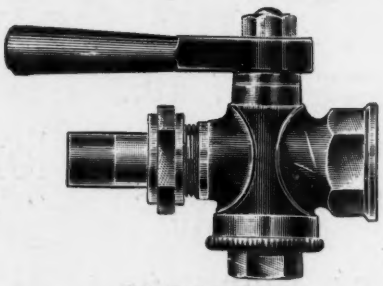

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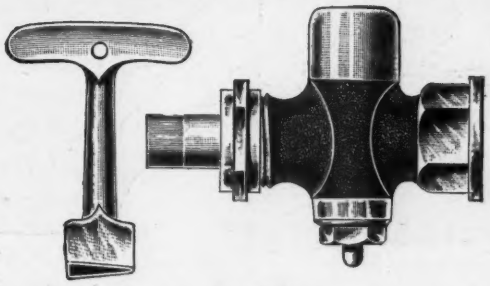

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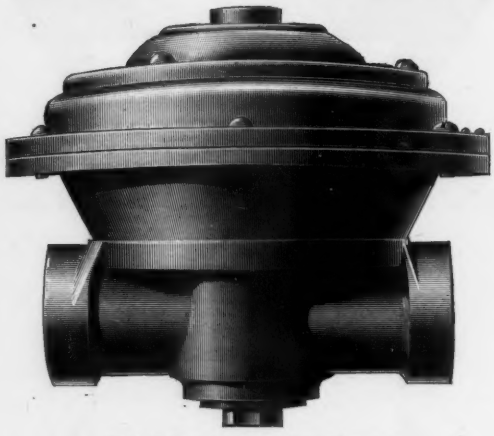

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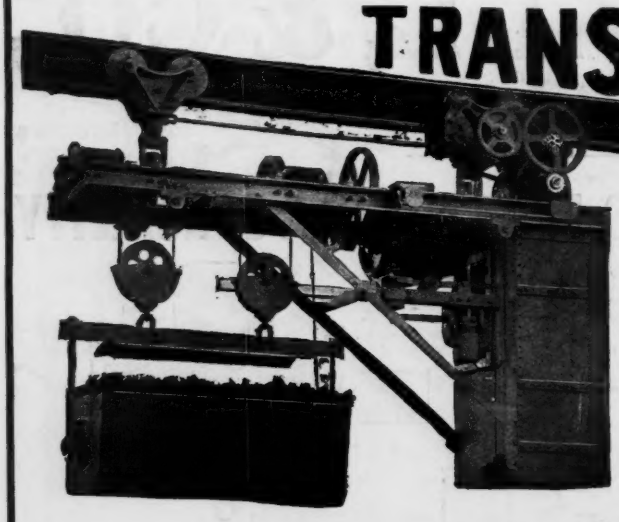

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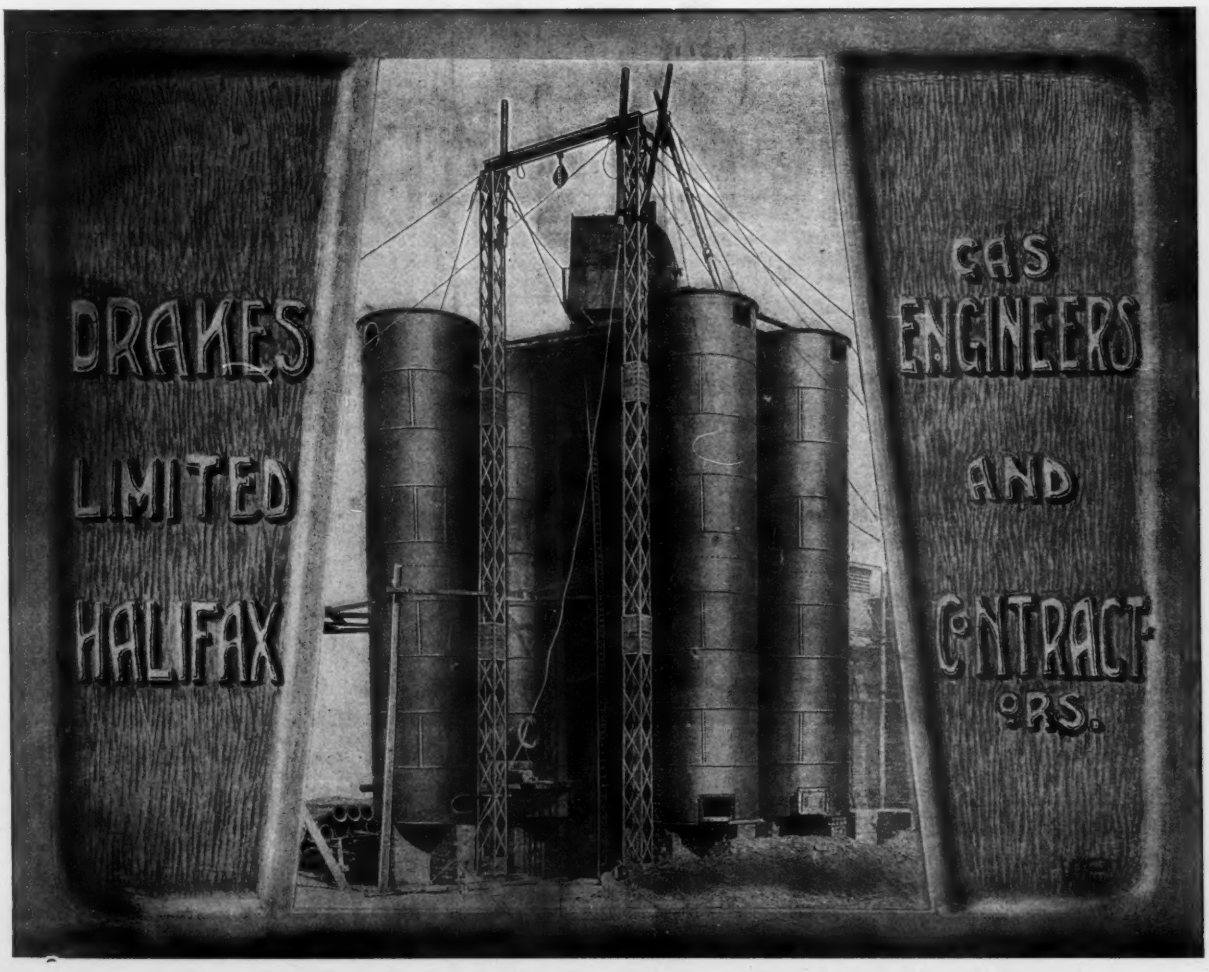

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WATER SUPPLY & SANITARY IMPROVEMENT

[REGISTERED AS A NEWSPAPER.

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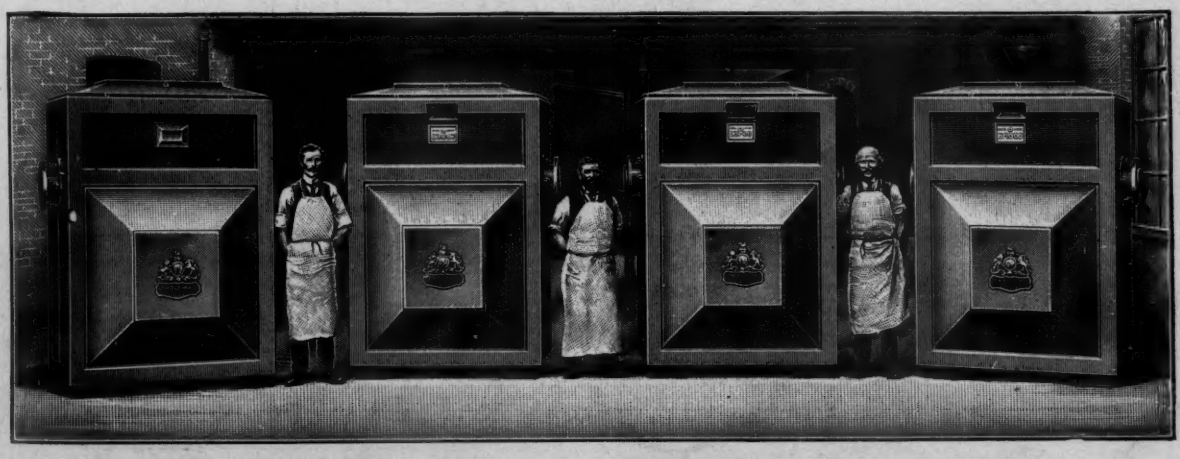

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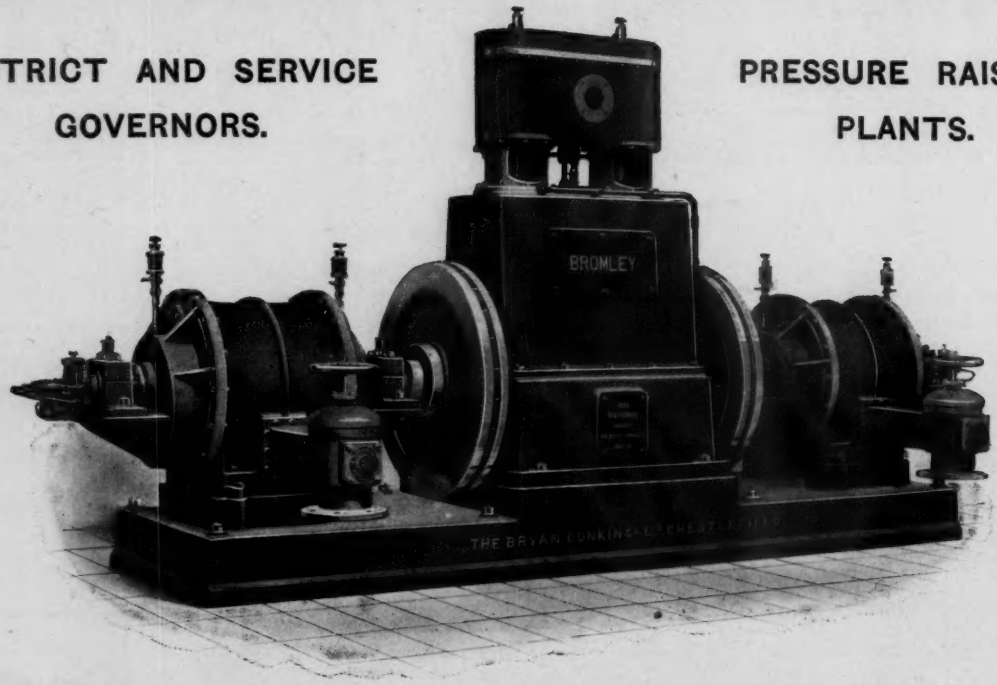

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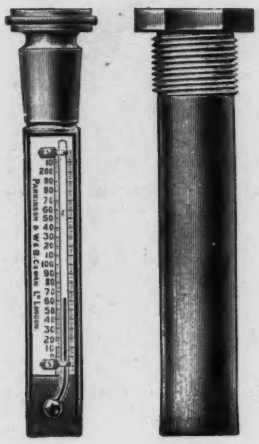

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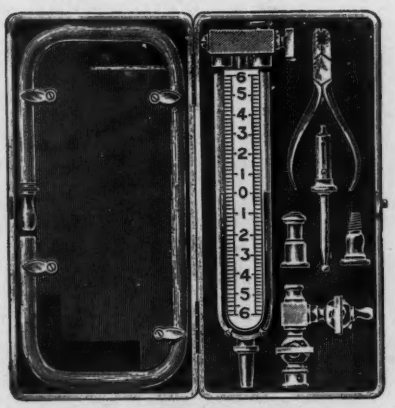

No. 5.

or any other convenient point of the fittings, open the two taps, and blow through the flexible tube until the pressure is raised to five or more inches. The tap to which the flexible tube is attached is then shut off. If the pressure is maintained, it will indicate that the fittings are sound. If these are leaky, pressure will fall.

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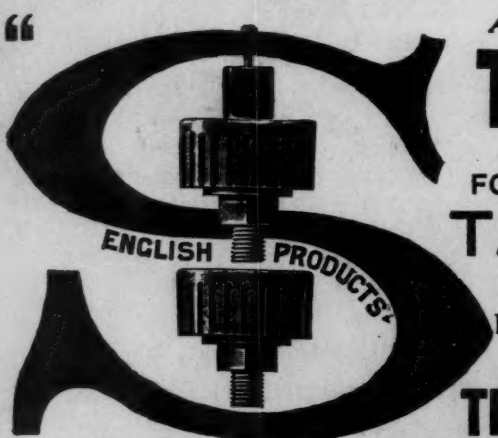

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Printed and Published by Walter King, at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, June 28, 1910.